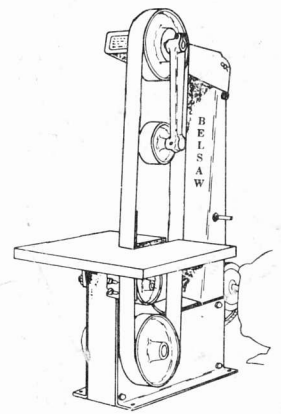
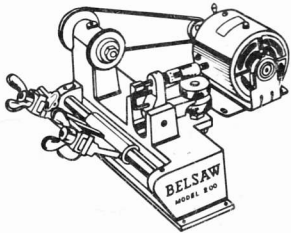
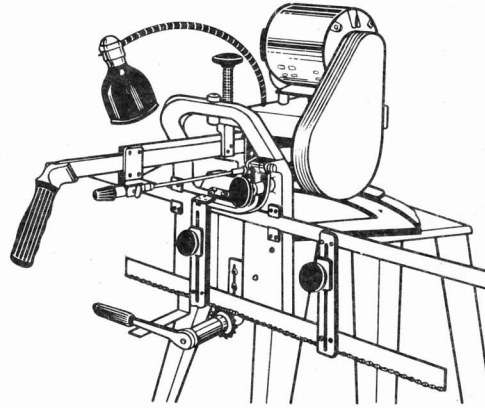
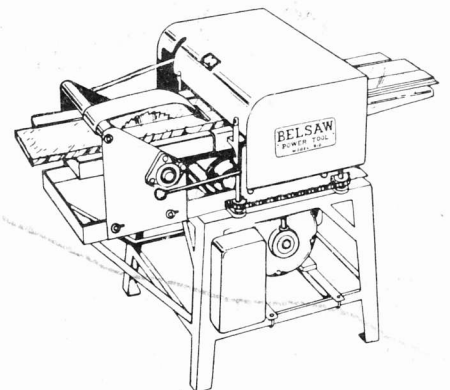
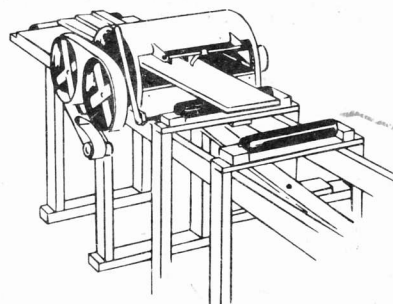
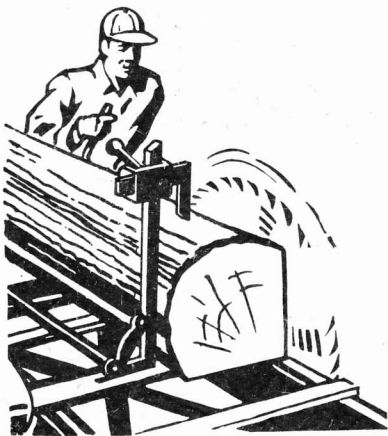


BELSAW



OPERATOR'S MANUAL and REPAIR PARTS LIST



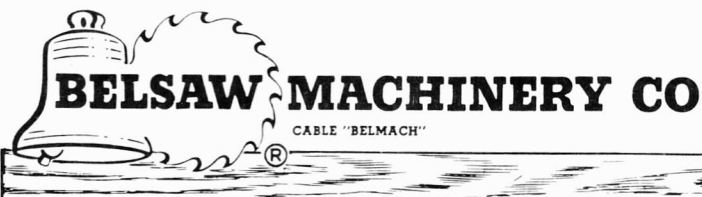
FULL WARRANTY

All BELSAW equipment is guaranteed against defective material or workmanship. Any defective part will be replaced free f.o.b. factory if returned, freight prepaid, within one year after purchase.

RETURNED GOODS

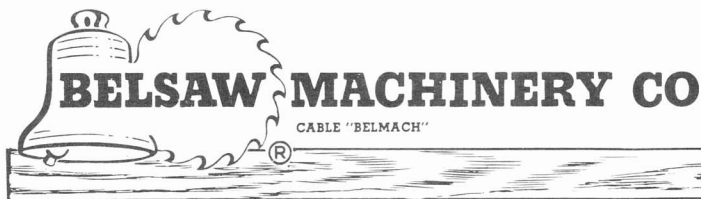
If you wish to return any item for any reason, write us for shipping instructions. Our Kansas City Office is NOT equipped to handle returns — we will advise you immediately the factory address to which the item is to be shipped, freight prepaid. This will avoid delay in making exchange, or any other adjustment.

Due to inflation and rising costs, parts prices are subject to change without notice. Therefore, should any part require replacement for other reasons or after the warranty period, please fill out the enclosed postage paid Price Request Card and mail it to us. We will then furnish you with current prices.



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Phone: 816 - 561-9255



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Phone: 816-561-9255

Dear Customer:

BELSAW OPERATOR'S MANUAL offers PRACTICAL SUGGESTIONS for utilizing the BELSAW SHARP-ALL to develop a PROFITABLE business.

Throughout the pages of this Manual, you are taken step-by-step over practical, everyday problems in handling all types of sharpening.

A careful, thorough study of this Manual will help the beginner attain proficiency on the popular style circular saw blades in fast time. Illustrations are carefully detailed in exact shape of teeth, showing operation from your working position at the BELSAW.

To our knowledge, the BELSAW OPERATOR'S MANUAL is the ONLY practical book of its kind ever published. It is a copyright treatise on expert care and sharpening of all types of circular saws. The book combines the experience of our engineers and expert craftsmen long engaged in the saw repair field.

Throughout the following pages we also cover the methods for sharpening many types of household, garden and shop tools. Beginners will find these instructions helpful in handling the first of each different tool. Practice will lead to faster and better sharpening results...short-cuts and different set-ups will occur to you as you become familiar with your BELSAW.

We hope that this material will help both the novice and the experienced mechanic to obtain more profitable results with his BELSAW.

Please feel free to criticize the instructions. Give us your frank opinion... both good and bad...and your suggestions for improving the contents.

Our Service Department will welcome your questions on any sharpening problems and we will do our best to provide the answers promptly.

Good luck with your money-making BELSAW.

Sincerely,
for BELSAW MACHINERY CO

Stan Field, President
SF/sal

INDEX

SECTION I

(Circular Saws)

Glossary of Terms	1	Joint and Gum a Rip Saw (Style A & C)	15
Introduction	2	Practice Exercise — Cut Off Saw (Style N)	16
Saw Grinding Assembly	2	Joint and Gum a Cut Off Saw (Style N)	16
Saw Arbor Assembly	2	Joint and Gum a Cut Off Saw (Style M)	18
Saw Set Assembly	2	Joint and Gum a Combination Saw (Style V)	19
Edge Tool Grinding Attachment	2	Joint and Gum the Style S Circular Saw Blade	20
Safety Rules	3	Electric Hand Saws	21
Circular Saw Operating Principles	4	Wide Tooth Spaced "Safety" Saw	21
How to Sharpen Circular Saws	4	Sharpening Carbide Tipped Saws	22
General Saw Sharpening Data	5	Hard Tip Saw	23
Learn the Kinds and Uses of Circular Saws	6	Top Grinding (Style C Tooth)	23
Popular Tooth Styles in General Production	6	Dado Set	23
Popular Style Rip Saw Teeth	6	Metal Cutting Saws	24
Popular Style Cut Off Teeth	6	Printers Saws	24
Popular Style Combination Teeth	6	Special Purpose Saws	24
Descriptive Terms Used for Circular Saws	7	Side Clearance	25
Side Clearance	7	Set Gauge	26
Template of Circular Saw Blades (Styles A-C-V)	8	Setting a Saw	27
Descriptive Terms Used for Circular Saws (Continued)	9	Bevel Grinding	29
First Principles of Saw Shop Operation	10	Style N and Style S Cutting Teeth	29
T-340B Feed Screw Adjustment	11	Cut Off Saw Bevel M Style	30
Practice Exercises—Rip Saws	12	Beveling Rip Saws	30
Joint and Gum a Rip Saw (Style A & C)	13	Saw Filing	31
How to Get the Proper Face Hook Angle	13	Hammering Circular Saws	32
Saw Tooth Rest (T-305, Key 33)	14	Setting Your Prices	32

SECTION II

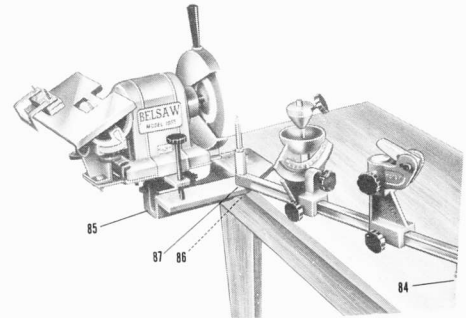
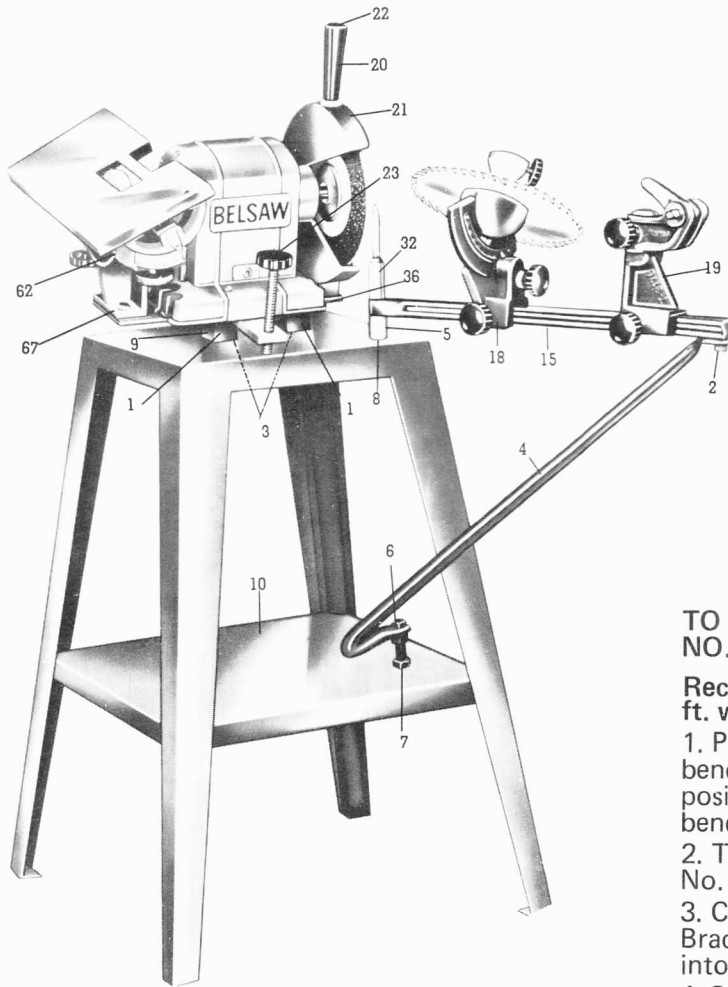
(Edge Tools)

Instructions for Edge Tool Grinding	1
Jointer and Planer Knives	3
Wood Chisels, Plane Irons and Other Straight Edge Tools	5
Rotary Lawn Mower Blades	6
Ice Skates	7
Screw Drivers	8
Grass Whips	8
Axes	9
Cleaver Wedges	9
Hatchets	9
Scissors	10
Tin Snips	10
Lopping Shears	11
Butcher Knives, Paring Knives and Similar Cutting Edges	11
Sharpening Prices	12
Belsaw Service Department	12

ASSEMBLY OF CIRCULAR SAW SHOP AND EDGE TOOL GRINDER

SHARP-ALL MODELS 10552 AND 10553

Floor Stand Model 10293



TO MOUNT BENCH MODELS NO. 10254 and NO. 10553

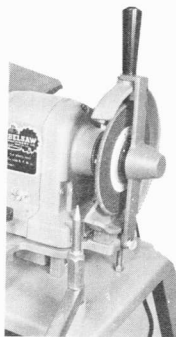
Recommended Bench Dimensions are 4½ ft. long x 3 ft. wide x 32 in. high with 2 in. thick top.

1. Place flange of No. 85 Motor Support Bracket on bench with its shoulder flush against front edge. Mark position for and bore the two 3/8" holes in top of bench; attach bracket with lag screws or bolts.
2. Thread No. 84 Cap Screw (½x1½ socket head) into No. 15 Saw Arbor Base Arm.
3. Connect No. 15 Arm to No. 85 Motor Support Bracket with No. 86 Machine Bolt (1½x2 square head) into No. 32 Base Arm Lock.
4. Screw No. 23 Feed Screw down through threaded hole in front of No. 36 Motor Pivot Base.

AFTER ATTACHING TO FLOOR STAND OR BENCH, COMPLETE ASSEMBLY AS FOLLOWS:

5. Connect No. 20 Handle to No. 21 Wheel Guard with No. 22 Machine Screw (¼x1½ round head).

Place grinding wheels on motor shaft between collars and tighten ½" hex nuts. Place the 3/8" thick spacer between outside collar and nut for wheels less than ¼" thick. Place the No. 10, T-630 Arbor Guard on right side of the grinder by inserting the opened end of the Arbor Guard under the No. 20 handle. Tighten the machine screw through handle to hold in position. Attach Z-106 Thumb Screw in the Arbor Guard to Motor Pivot Base. This guard is a Federal Safety Requirement and must be in place whenever grinder is in operation.



6. Place No. 18 Saw Arbor and No. 19 Saw Set Assemblies on No. 15 Saw Arbor Base Arm. Set pointer on No. 18 Saw Arbor at Zero degrees. Place level across top of Saw Arbor and if necessary, twist the flattened part of No. 4 Long PIPE AS NEEDED FOR FREE SWING.

7. For model including edge tool grinder, mount tilting table assembly. Tighten No. 62 cone point set screw in sockets of No. 67 base. Lock with hex nuts.

TO MOUNT ON FLOOR STAND MODEL NO. 10293 MODELS NO. 10253 and NO. 10552

1. Attach No. 1 Lugs to Floor Stand Top with No. 3 Cap Screws (3/8-16x½ Socket Head). Screw No. 9 Cone Point Set Screws (½-13x2) through No. 1 lugs until they are point to point for alignment. Tighten No. 3 Cap Screws. Attach No. 36 Motor Pivot Base to No. 1 Lugs with No. 9 Cone Point Screws. Tighten Screws for slight brake pressure as motor swings backward and forward. Lock with Hex Nuts. If motor does not pivot freely, back off pressure slightly and if necessary lubricate tips of No. 9 Cone Point Screws.

2. Run No. 8 Carriage Bolt (½-13x3½) up through square hole in Floor Stand Top. Slip on No. 5 Spacer and No. 15 Saw Arbor Base Arm. Use No. 32 Base Arm Lock for Nut.

3. Bolt No. 4 Long Pipe to No. 15 Arm with No. 2 Cap Screw (½-13x1) and to No. 10 Shelf with No. 6 Machine Bolt (½-13x2¾ Hex Head). Adjust No. 7 Hex Lock Nuts to level No. 15 Arm.

5. Screw No. 23 Feed Screw down through threaded holes in front of No. 36 Motor Pivot Base. Use punch to push nylon plug in No. 36 and No. 67 for more tension on No. 23 and No. 69.

PARTS LIST

FIGURE 1

MODEL Nos. 10552 and 10553

ALL UNNUMBERED
PARTS INTERCHANGEABLE
WITH OPPOSITE SIDE

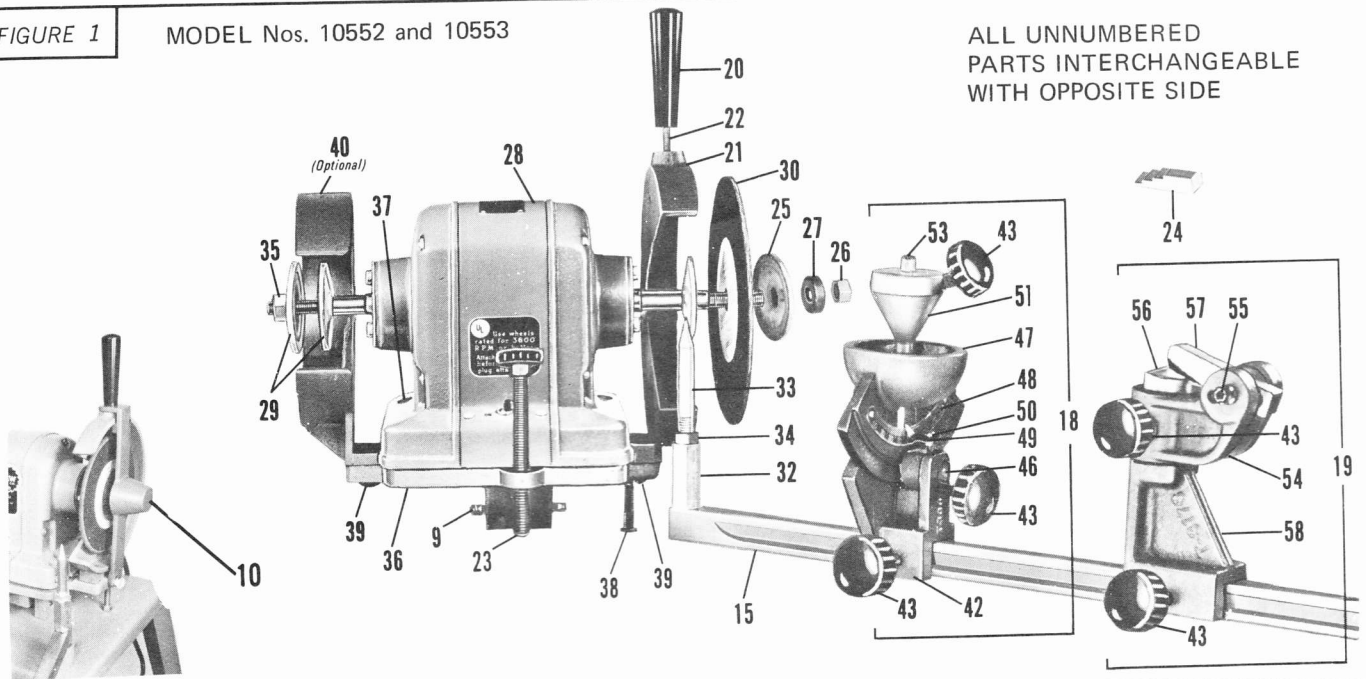


FIGURE 2

MODEL Nos. 10552 and 10553
EDGE TOOL GRINDER

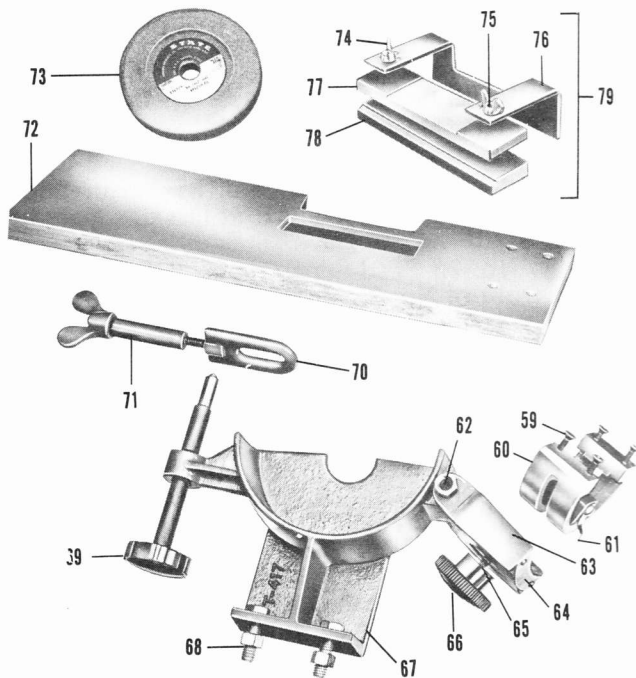
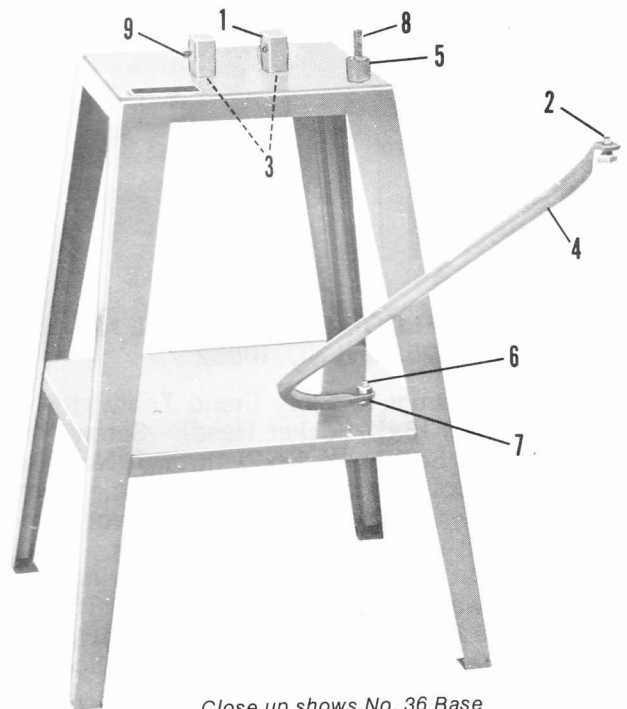


FIGURE 3

MODEL No. 10293
FLOOR STAND



Close up shows No. 36 Base
mounted between No. 1 Lugs.

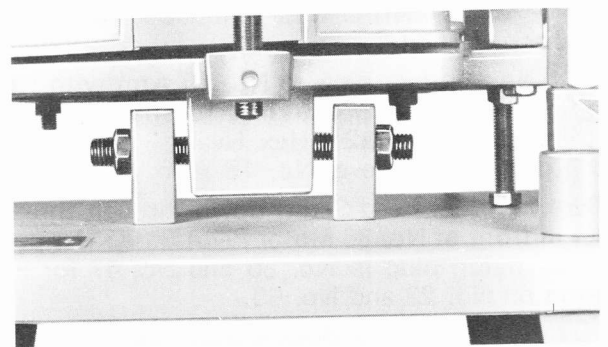
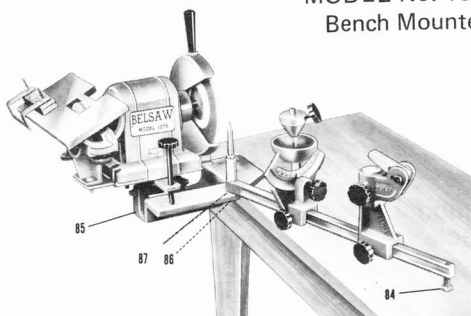


FIGURE 4

Additional Parts For
MODEL No. 10553
Bench Mounted



CIRCULAR SAW AND EDGE TOOL GRINDER

MODEL NUMBER 10253 10254 10293 10552 10553

WHEN ORDERING REPAIR PARTS, ALWAYS GIVE FOLLOWING INFORMATION AS SHOWN IN THIS LIST.

1. THE PART NUMBER 2. THE PART NAME 3. THE MODEL NUMBER 4. THE NAME OF ITEM

Do not use Key Numbers when ordering Repair Parts, always use Part Numbers.

PARTS LIST

Key Part
No. No. Description
PARTS FOR MODEL NO. 10292 FLOOR STAND
(Fig. No. 3) Keys Nos. 1 through 9

1	T-428	Lugs
2	*Z-39	Cap Screw (1/2-13 x 1 hex)
3	*Z-2	Cap Screw (3/8-16 x 1/2)
4	T-352A	Long Pipe
5	T-429A	Spacer
6	Z-108	1/2-13x3/4 Hex Head Machine Bolt
7	*Z-4	Hex Nut (1/2-13)
8	Z-107	Carriage Bolt (1/2-13x3/2)
9	T-391	Cone Point Screw (1/2-13 x2) and hex nut

PARTS FOR MODEL No. 10253 CIRCULAR SAW
SHOP (Fig. No. 1) Key Nos. 15 through 58

10	T-630	Arbor Guard
11	None	
12	None	
13	None	
14	None	
15	T-252C	Saw Arbor Base Arm
16	None	
17	None	
18	T-299	Saw Arbor Assembly
19	T-386	Saw Set Assembly
20	T-345	Handle
21	T-257	Wheel Guard
22	*Z-8	Machine Screw (1/4-20 x 1 1/2 round head)
23	T-340B	Feed Screw
24	T-383	Bevel Gauge
25	T-388	Wheel Collars (2-3/4" dia.) (pair)
26	T-389	Nut, Right-Hand (1/2-20 hex)
27	T-318	Collar Spacer (3/8 x 1-1/4)
28	T-260D	Motor, 1/2 H.P., 115V, 60 cy.
29	T-526	Wheel Collars (2-1/4" dia.) (pair)
30	836	**Grinding Wheel (8 x 3/16)
31	None	
32	T-306	Base Arm Lock
33	T-305	Saw Tooth Rest
34	*Z-13	Nut (1/2-13 hex)
35	T-390	Nut, Left-hand (1/2-20 hex)
36	T-251A	Motor Pivot Base
37	*Z-11	Carriage Bolt (5/16-18 x 2)
38	T-392A	Machine Bolt (3/8-16 x 3 1/2 hex and nut)
39	*Z-18	Cap Screw (3/8-16 x 1 1/2 nut and washer)
40	T-336B	Wheel Guard (6") (Optional)
41	None	
42	T-300D	Saw Arbor Base
43	T-393A	Fluted Knob Screw (1-1/4")
44	None	
45	None	
46	T-343A	Locking Pin
47	T-301	Tilting Arbor
48	T-303	Scale with (2) drive screws
49	T-304	Scale Pointer
50	*Z-17	Machine Screw (10-24 x 1/4 round head)
51	S-301	Saw Locating Cone

Key	Part	
No.	No.	Description
52	None	
53	T-302	Saw Locating Stud
54	T-313A	Saw Set Guide
55	T-395A	Cap Screw -(3/8-16 x 1-3/4)
56	T-314B	Anvil
57	T-311B	Set Punch
58	T-317C	Saw Set Base

PARTS FOR MODEL No. 10552 EDGE TOOL GRINDER
(Fig. Nos. 1 and 2) Key Nos. 15 through 79

59	*Z-146	Flat Head Socket Set Screw (10-24 x 5/8)
60	T-424A	Pivot Segment
61	S-316	Pointer
62	T-425	Cone Point Set Screw (3/8-24 x 1 1/4 and Nut)
63	T-416A	Support Bracket
64	T-426	Scale and drive screws
65	*Z-145	Carriage Bolt (1/4-20 x 1)
66	L-351	Pivot Screw
67	T-417B	Base
68	*Z-18	Hex Head Cap Screw (3/8-16 x 1 1/4 Washer and Nut)
69	T-419B	Feed Screw
70	T-415A	Lock
71	T-427	Lock Screw
72	T-418B	Tilting Table
73	T-434	Grinding Wheel (4 x 1/2 x 1/2)
74	*Z-140	Wing Nut (1/4-20)
75	*Z-149	Set Screw (1/4-20 x 2)
76	T-422A	Tool Holder Guide
77	T-421B	Tool Holder Clamp
78	T-420A	Tool Holder Base
79	T-431	Tool Holder Assembly

PARTS FOR MODEL 10553 EDGE TOOL GRINDER
(Fig. Nos. 1 and 2) Key Nos. 15 through 79 plus
(Fig. No. 4) Bench Mounting Key Nos. 84 through 86.

80	None	
81	None	
82	None	
83	None	
84	T-397	Cap Screw (1/2-13 x 1 1/2 Socket Head)
85	T-250B	Motor Support Bracket
86	*Z-10	Machine Bolt (1/2-13 x 2 1/2 square head)
87	T-318	Spacer (3/8x1-1/4) not shown, located between Key No. 15 and No. 85.

PARTS FOR MODEL No. 10254 CIRCULAR SAW SHOP

(Fig. No. 1) Key Nos. 15 through 58 (plus Fig. No. 5)
Key Nos. 84, 85, 86, 87.

T-405A Operating Manual and Parts List
**1. Use only Grinding Wheel tested for safe operation at 3600 RPM.
*2. Standard Hardware Item — May be purchased locally.

TO ORDER REPAIR PARTS

Your Belsaw SHARP-ALL is warranted for one full year against defective material or workmanship. Should any part need replacement during this period for reasons other than normal wear or abuse, please write us for shipping instructions. **Our Kansas City office is not equipped to handle returns.** We will advise you immediately the correct factory address to which the item is to be shipped. This will avoid delay in making the required adjustment.

Due to inflation and rising costs, parts prices are subject to change without notice. Therefore, should any part require replacement for other reasons or after the warranty period, please fill out the enclosed postage paid Price Request Card and mail it to us. We will then furnish you with current prices.



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GLOSSARY OF TERMS

Before you get started actually sharpening blades you should become familiar with some of the terms that you will be using everyday in your sharpening operation.

JOINTING: (*Sometimes called Rounding*): First step in resharpening circular blades. Brings blade to true cutting circle with every tooth the same height.

GUMMING: Refers to the grinding, shaping, or increasing the depth of the gullets on a circular blade.

GULLET: Space between back and face of each tooth. Used to carry waste material caused by cutting action.

ARBOR: (*Also see Arbor Hole*) Generally, the shaft or spindle on which an object is carried, such as the motor shaft on the Sharp-All.

ARBOR HOLE: (*Also see Arbor, Eye*) Refers to the hole in the middle of the circular blade. Usually round, it also comes in square, oblong and diamond shapes.

EYE: Same as Arbor Hole, which is the most common terminology used.

SET: Generally, the terminology used for one of the methods of providing clearance in the cut of material being sawed so blade does not bind or jam.

DRESS (ing): Referring to grinding wheels, the method using a Dressing Tool to shape wheel to desired shape or remove glaze.

DRESSING TOOL: Tool used when dressing wheel to desired shape or when removing glaze. Can be either abrasive stick or diamond tipped.

RIM: The outside diameter of the saw blade — a circle of the tooth points.

HOOK: The pitch or angle of a line along the face of the tooth to a circle on the saw blade.

RIP SAW: Saw blade which cuts with the grain of the wood, both hand and circular.

CUT-OFF SAW: Saw blade designed to cut ACROSS the wood grain.

COMBINATION: Combines the advantages of both the Rip Saw and Cut-Off blade. Can cut either with the grain, across the grain or at any angle to the grain.

CARBIDE (TIPPED): A metal that is extremely hard. Carbide teeth are attached to a saw blade by a special process using silver solder.

INTRODUCTION

Now that you have your machine properly assembled with all nuts and bolts properly tightened, let's examine each of the four main assemblies that you will be using when sharpening with your Belsaw Sharp-All.

Detailed operating instructions are covered later in the manual. These are general descriptions that will enable you to understand the function that each assembly plays in the sharpening operation. Please refer to the parts list that is keyed with the pictures in the front of the Manual, and if possible, have the actual part being explained in front of you for easy examination.

SAW GRINDING ASSEMBLY

This is the assembly attached to the right side of the motor as you stand in normal operating position. The grinding wheels you will be using are placed on the motor shaft with the wheel collars on both sides. The wheel and collars are held in place with a spacer and a hex nut.

The metal housing partially covering the grinding wheel is a safety guard. With the motor supplied on your Sharp-All turning at 3450 RPM, an 8-in. grinding wheel develops a rim speed of 7200 feet-per-minute. This can produce quite a burn, and you should exercise caution to keep hands and clothing from coming in contact with the wheel while it is in operation.

SAW ARBOR ASSEMBLY

The T-299 Saw Arbor Assembly (Key No. 18) is the assembly on which the saw blade is held in position when sharpening. The threaded T-393A Hand Control Knob at the bottom of the assembly tightens against the Base Arm and is loosened to adjust the required distance from the grinding wheel for larger or smaller diameter blades. Another Hand Control Knob allows it to be tilted either right or left a maximum of 45-degrees for beveling the teeth on certain types of circular blades.

The third Hand Control Knob in this assembly is on the S-301 (Key No. 51) Saw Locating Cone which is used to hold the blade in position when the Arbor hole (eye) of the saw blade is over 1/2-in. in diameter. Blades having exact 1/2-in. arbor holes are simply placed over the T-302 (Key No. 51) Saw Locating Stud with the Cone placed on top of the blade and tightened to keep the blade from vibrating and bouncing while grinding. After sharpening, if it is necessary to spring-set the blade, the blade is left on this assembly during the setting operation.

SAW SET ASSEMBLY

The T-386 Saw Set Assembly is used when spring setting circular saw blades. ONLY spring set blades are ever set on this assembly. Hollow Ground and swage set blades have other methods whereby they provide for clearance in the cut.

Like the Saw Arbor Assembly, the Saw Set Assembly may be moved closer or farther from the Saw Arbor to accommodate the different sized blades. It can also be completely removed while you are sharpening the blade if you so desire.

After all sharpening is completed, the Saw Set Assembly is then placed the proper distance from the Saw Arbor Assembly and spring set. You will notice that there is another Hand Control Knob closer to the top of this assembly. This allows the upper half of the assembly to rotate either right or left. The reason for the upper half rotating will be covered later in the Manual under instructions for Spring Setting a blade.

EDGE TOOL GRINDING ATTACHMENT

The other part of your Sharp-All is the attachment that is used for sharpening just about everything that has an edge on it; planer blades, jointer blades, long and short shaft chisels, screwdrivers, rotary lawnmower blades, scissors, looping shears, butcher knives, grass whips, axes and meat cleavers. This would be only a partial list of the number of tools that can be sharpened with your Sharp-All Edge Tool Grinder. With practice and ingenuity, your Sharp-All can be adapted to sharpen virtually any tool you will run across.

EDGE TOOL GRINDING ATTACHMENT (continued)

In Figure 2 of the pictured parts list, is the Universal Tool Holder Assembly, Key 79, T-431. This is the part that will hold the various tools that you will be sharpening, unless they are to be done free-hand.

The Tilting Table, Key 72, T-418B, is the table upon which the Tool Holder slides, or if sharpening free hand, supports the hand of the Operator and/or the tool itself.

At the bottom of Figure 2, you will notice two Hand Control Knobs similar to the ones on the Saw Arbor Assembly which we examined earlier (they perform the same basic function).

The knob on the right hand side as shown on the parts list is used to control the bevel angle and allows the table to be tilted either right or left a maximum of thirty degrees.

The knob on the left side controls the amount of surface to be exposed on your grinding wheel. The 4x½-in. grinding wheel that comes with your Sharp-All may be removed at any time, and replaced with a buffer or wire brush, if you so desire. The 4x½-in. grinding wheels are especially selected for use in sharpening, and may be reordered at any time. Specialty items such as wire brushes and buffer wheels are not standard items, and must be purchased locally.

We will cover each part individually in the Manual and explain their function in detail. The previous instructions are merely to get you acquainted with their names. There are only four basic assemblies and to repeat them again, they are: *Saw Grinding Assembly*, *Saw Arbor Assembly*, *Saw Set Assembly* and the *Edge Tool Grinding Assembly*.

SAFETY RULES

BEFORE OPERATING YOUR SHARP-ALL be sure the electrical circuit that you are using is not overloaded, and the proper fuse is being used. The motor supplied with your Sharp-All should be plugged into your normal 110-Volt house current only.

Take the same precautions that you would whenever you are working with electricity. Never install your Sharp-All on a floor with excessive moisture, and be sure the area where you will be standing when operating your machine is also dry. If your working area is normally damp, obtain some form of insulating material and place it under your machine and in areas where you will be standing.

Your Belsaw Sharp-All was designed and built to provide as much protection to the operator as possible. However, to take full advantage of these safety factors, the operator must observe these few basic safety rules.

1. Never turn on the motor without first checking to be sure the nuts holding both grinding wheels are in place tight, and No. 10 T-630 Arbor Guard is in place.
2. Always check new grinding wheels to make sure they were not cracked or broken in shipment. Periodic checking of grinding wheels that have been in use for a long time, may reveal damage that could lead to a mishap if not caught in time.
3. Use only the grinding wheels that are recommended for use on your Sharp-All. Details for inspection, care and use of grinding wheels will be covered later.
4. Remember that all circular blades and edge tools are sharp, and handle them carefully to avoid cutting hands and fingers. Never lay them on your bench with the edge or teeth extending over.

SAFETY RULES (continued)

5. Always protect your eyes when using any type of grinding wheels. Safety goggles are best, and may be purchased directly from Belsaw. They are listed on the Supplies Order Blank which you will find in the back of this Manual.
6. Always use reasonable caution to avoid injury to fingers and hands when grinding. Never become so overconfident as to become careless.
7. Keep your machine and working area clean. Besides the safety factor, time spent looking for tools and supplies could well be used sharpening items that would be making money for you.

Observing the general safety rules necessary whenever operating any equipment will assure years of accident free operation.

CIRCULAR SAW OPERATING PRINCIPLES

Circular saw sharpening can be the very heart of your business. It is worth your while to study and thoroughly understand the principles of circular saw operation.

1. A circular saw will cut cleanly and easily ONLY when it is true-round, sharp and the teeth have the proper side and back clearance.
2. When a saw does not cut easily, it is usually dull or has lost tooth clearance. If material is forced into the saw after it becomes dull, the blade will heat and begin to bind or wander off its normal straight line. This can not only ruin material but can also damage the blade so that it cannot be resharpened.
3. Sharpening the saw BEFORE it has been run in dull condition is far more economical for the operator. Frequent sharpening gives the saw a much longer life.

Always examine the saw carefully BEFORE you start to sharpen. Make sure that it is not cracked or warped. If the blade has accumulated gum or pitch, carefully remove it by soaking in hot water and wiping clean or use a wire brush or Saw Polishing machine. Then check for burns, cracks or warping. If the saw indicates such damage, put it aside for your customer to see the condition BEFORE doing further work on it.

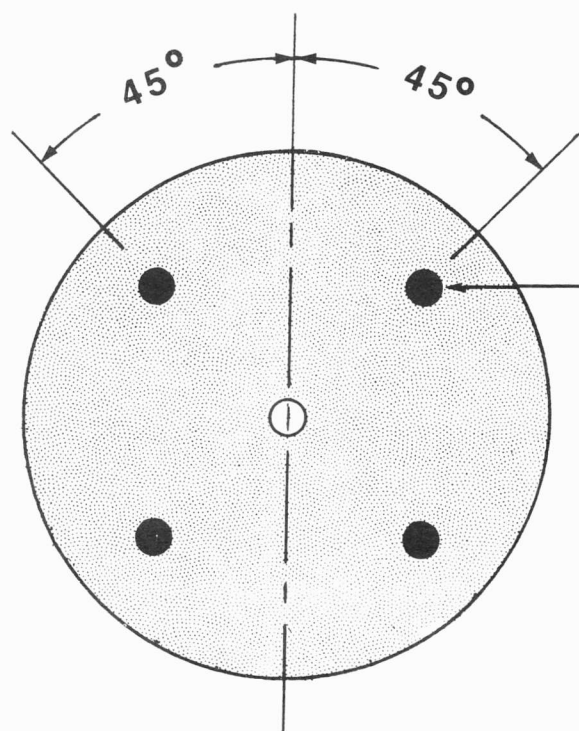
HOW TO SHARPEN CIRCULAR SAWS

Parts names and numbers of your machines are shown in the PARTS LIST. Learn these to simplify your following the detailed instructions covering the grinding of circular saws and other tools. After reading completely through the manual and setting up your machine for operation, we suggest that you practice on some old tool which is already familiar to you. Take the page of the manual that covers this same or most similar tool and follow each step exactly as outlined. Continue with the manual page in front of you until you feel that you have mastered the use of your machine on this first tool — then lay the manual aside and repeat the operations on the same tool from memory. A few practice sessions will quickly bring you the “feel” of the machine and give you the confidence that leads to fast, accurate sharpening.

Don't be discouraged if your first results are less than satisfactory. Stay with the manual and you'll soon catch onto the few motions that are necessary to improve your speed and accuracy.

Keep in mind that you are learning to use a simple machine that will qualify you as an expert sharpening “smith” after you have mastered it.

GENERAL SAW SHARPENING DATA



Before placing a new grinding wheel in service, check for any damage that might have occurred during shipment. Place a screwdriver through the arbor hole and "tap" side of wheel with a solid, non-metallic object.

"Tap" wheels about 45 degrees each side of the vertical centerline and about 1 or 2 inches from the rim as indicated by the four spots in the figure at the left. Then rotate the wheel 45 degrees and repeat the test. A sound and undamaged wheel will give a clear metallic tone. If cracked, there will be a dead sound and not a clear ring.

Grinding wheels must be mounted between clean, true collars with blotters between wheel and collars.

While an "average" thickness wheel, such as the standard 3/16-in., can always be brought to necessary working shape with a wheel dressing tool, you will find with experience that it is much faster and cheaper to select the thickness wheel for most of the popular types of saws in the pages of this manual covering saw sharpening.

Sharpen saws at a rate that will give the abrasive grinding wheel time enough to cut free and clean. Feed and grinding wheel into the gullet easily and evenly, leaving enough metal to clean out on final touch-up grind.

When the wheel face glazes, gums or fills, it should be dressed.

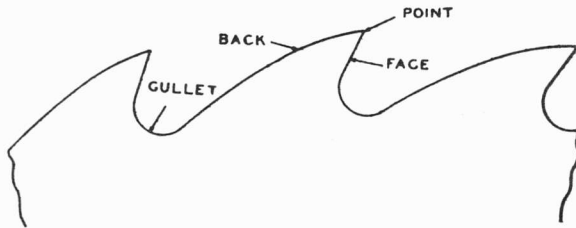
Overheating and burning of the work can be avoided by taking repeated light grinding cuts instead of trying to remove too much metal at each pass. Special care is required at the tips of all metal blades and throughout the entire length of very thin blades. Whenever the work feels hot or starts to blue, dip it in water to reduce temperature before further grinding. Practice drawing the work past wheel as rapidly as you can at an even speed. This helps avoid localized heat that causes burning.

Hand filing of circular saws is a craft that requires many years of practice to master. The average man can't do a decent job of sharpening with a file. The few who can turn out fine work this way seldom develop enough speed to earn a worthwhile income.

With your Sharp-All you eliminate all of the really hard work and you soon acquire the skill that produces uniform high quality. With only reasonable practice you will also gain the speed that means high income for your working hours.

LEARN THE KINDS AND USES OF CIRCULAR SAWS

All Saw Teeth Have
The Same Name Parts



THERE ARE THREE GENERAL TYPES OF SAWS:

(1) Rip saws cut with the grain of the wood; (2) Cut-Off saws cut across the grain; (3) Combination saws cut with the grain, across the grain, and also cut at any angle to the grain.

POPULAR TOOTH STYLES IN GENERAL PRODUCTION BY LEADING SAW MANUFACTURERS



POPULAR STYLE RIPSAW TEETH

Rip Saw teeth act as a series of small chisels. Style "A" is the most popular rip saw. It is used on almost all kinds of ripping in all diameters. Style "C" is popular for rip saws 6-in. to 10-in. diameter, particularly electric handsaws.



POPULAR STYLE CUT-OFF TEETH

CUT-OFF saws are used for squaring or trimming to length. They sever the wood fibers with a shearing action. Style "N" is a general cross-cutting tooth used on all saws that feed the wood above the center of the saw. It is also used as a combination saw. Style "M" is a V-shaped tooth used on overhead swing saws and others that feed the wood below center of the saw.



POPULAR STYLE COMBINATION TEETH

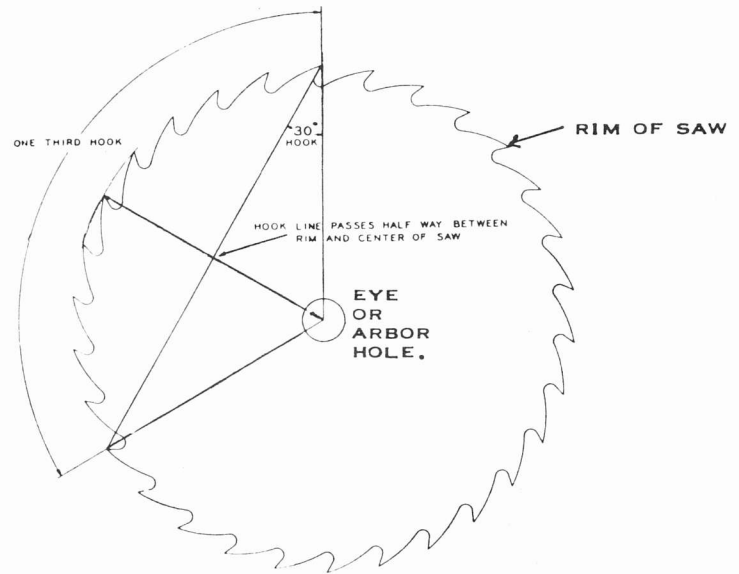
COMBINATION Saws are so named because they will rip, cross-cut and mitre. Style "S" uses a "raker" tooth to clean out behind each set of the four small cutting teeth. When made flat ground, this style is also called a "Novelty Saw." When hollow ground it is known as a "Planer Saw." The "V" Style Combination resembles Style "A" Rip Saw but has less hook angle and its teeth are beveled to cut both with and across the grain. This is one of the most popular blades on the electric hand saws.

DESCRIPTIVE TERMS USED FOR CIRCULAR SAWS

The **EYE** or **ARBOR HOLE** fits on the mandrel or machine shaft. It is generally round, but now also found in special diamond, square, and oval to fit on individual brands of electric handsaws. All measurements are taken from the **EYE**.

RIM is the outside or greatest circumference of the saw blade...a circle of the tooth points.

HOOK is the pitch or angle of a line along the face of the tooth to a circle on the saw blade.



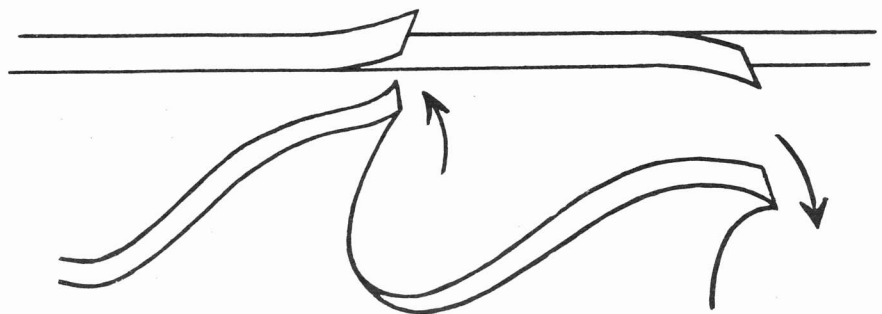
Rip Saws have a hook half the distance from the eye to the rim for use in hard-cutting wood. For soft-cutting wood, the hook angle is two-thirds distance to the rim.

The Standard rip saw hook to a circle half-way between center and rim is also described as "one-third hook" and the actual hook angle is 30 degrees.

HOOK of CUT OFF saws Style "N" is to center — a line along the face of the tooth will pass through the center of the saw. This hook is called "Center Pitch". On the Style "M" CUT-OFF a line from the point runs through the exact middle of the v-tooth to the eye, and its hook is known as "V-Pitch".

SIDE CLEARANCE

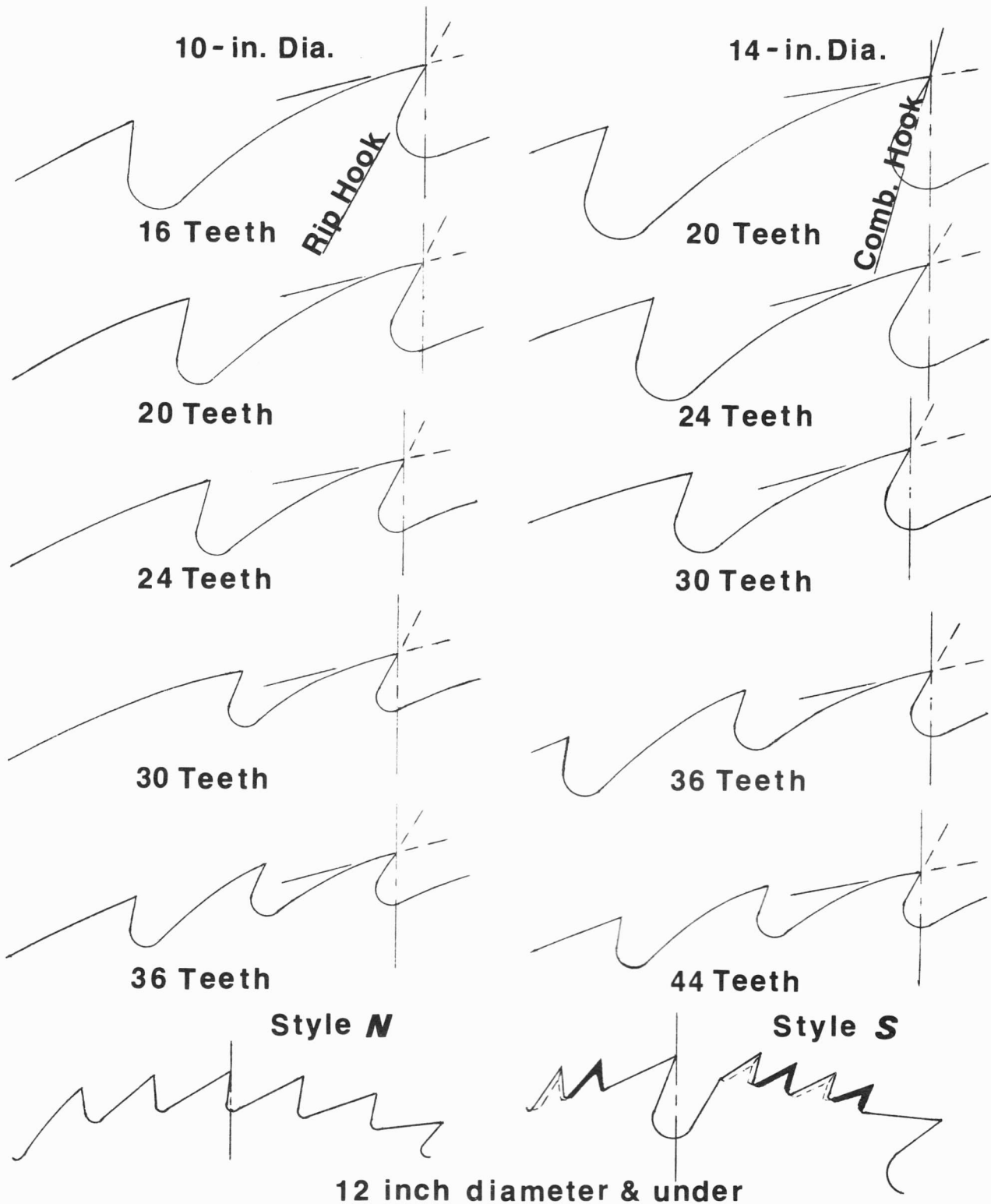
The cutting points of all circular saw teeth must be wider than the body of the saw to avoid binding, rubbing and burning. This side clearance is ground into the blade of a *hollow ground* saw.



The teeth of all *flat-ground* saws must be either "Set" or "Swaged".

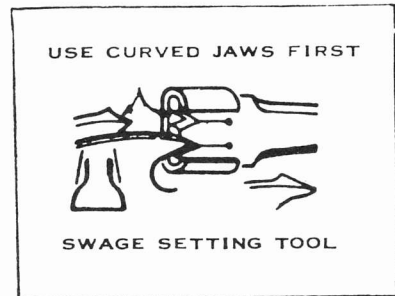
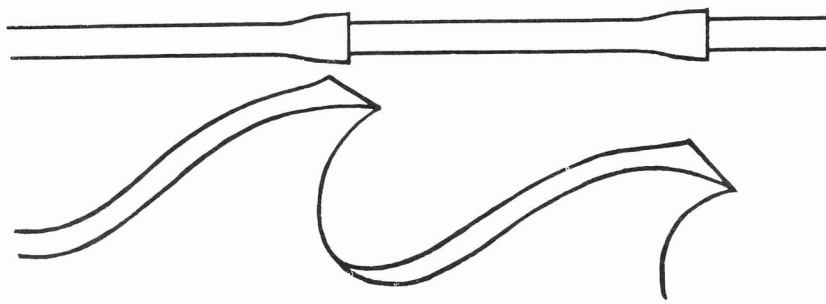
SETTING is bending the teeth alternately right and left to provide clearance. A uniform even set is essential for an easy running smooth cutting saw. Full data on this operation will be found in the sections "SET A SAW".

Template Of **Circular Saw Blades** Styles **A-C-V** (use pitch line specified)



These templates show one saw manufacturers specifications. When you start, you may want to trace and use them as a guide. You can make minor variations without sacrificing saw performance should your customer insist . . . and as you find the shapes that satisfy your customers best and are easiest for you to produce.

DESCRIPTIVE TERMS USED FOR CIRCULAR SAWS — Continued



SWAGING is spreading the point of every tooth for clearance. Swaging is done with a "Lever Swage", "Circular Saw Shaper", or the simple "Upset Swage" pictured here. The Swaged saw is preferred on power feed machines because it will take a faster feed than a Set Saw. However, it also requires far more power because each tooth is cutting its full width.



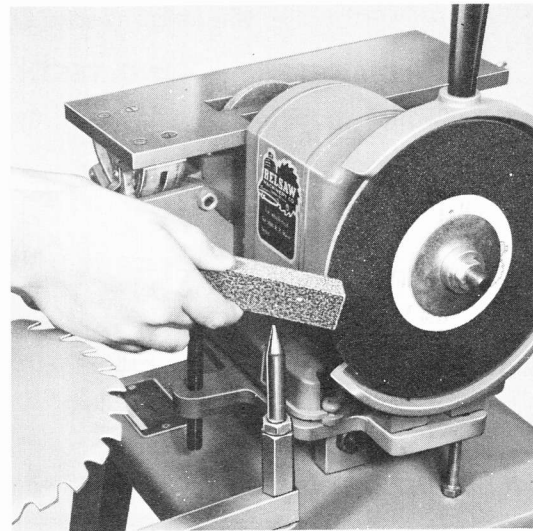
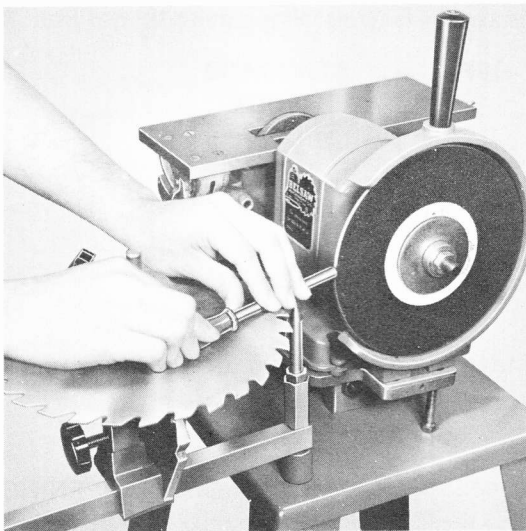
A.



F.

Saw grinding wheels 8-in. diameter running at 3450 rpm must be RESINOID bond, tested for 3600 rpm.

All Belsaw grinding wheels are supplied in straight A face — except $\frac{3}{8}$ -in. thick wheel has round F face.



Wheel dressers are used to shape the face of wheels and to remove glaze. Generally, there are two types of dressing tools. Both are used freehand, but may be supported as shown in the above pictures. The diamond wheel dresser has a $\frac{1}{3}$ Carat Industrial Diamond embedded in the tip and is best for a finer finish and extreme accuracy. The Abrasive stick is a practical, inexpensive dresser and is excellent for removing the glaze from your grinding wheels.

FIRST PRINCIPLES OF SAW SHOP OPERATION

Safety is the first requirement in any shop. As in any use of grinding wheels, you should wear either a safety face shield or goggles. To avoid injury from any contact with wheel shafts, cut small sections of garden hose to cover both shaft and nut. Remember that saw teeth are sharp and handle blades carefully to avoid cutting fingers. CLEAN shops are efficient shops. Keep both room and machines clean.

To produce the best results with your Sharp-All it is recommended that you use Belsaw RESINOID bonded grinding wheels. Our wheels have been especially designed to provide you with the proper grit, grade, and bond needed to give a longer life and excellent performance on each and every blade you sharpen. CAUTION: The motor supplied with your Sharp-All is rated at 3450 RPM and develops a rim speed of 7200 ft. per minute on an 8-in. diameter wheel. At this high speed use only resinoid bonded wheels instead of the ordinary vitrified wheel supplied by many dealers.

For customers having trouble with burning on small thin saw blades, we have a special soft wheel available in the 8x3/16-in. size.

As your grinding wheels wear down too small for saw gumming put them aside for other bench grinding. The double-end motor shaft allows for regular bench grinding, wire-brush, buffer, etc.

Tooth outlines on saws vary according to which manufacturer made them and how they have since been filed. It is neither desirable nor possible for you to change the tooth outline completely the first time you sharpen a saw. It is best to gradually correct wrong tooth shapes over a period of several sharpenings. The same applies to spacing between teeth. It is desirable to have exactly uniform distance between teeth. Equal spacing of teeth should be accomplished in successive sharpenings.

As a guide to the standard spacing of saw teeth, the templates on page 8 may prove helpful:

DIAMETER	NO. TEETH RIP	CUT-OFF	STANDARD GAUGE
4-8 in	36	100	18
10-18 in.	36	100	16-12
20-28 in.	36	70	12-10
30-36 in.	36	70	10- 9

Very thin gauge saws should always have more teeth and shorter teeth than standard gauge saw of same style.

ROUNDING (or *JOINTING*) is the first essential and MUST be accomplished on EACH SHARPENING of any circular saw.

GULLETS should also be brought in to uniform full rounded depth whenever jointing or tooth grinding has lessened the original tooth length by more than $\frac{1}{4}$. This also gives the front of the tooth POINT.

BACK of tooth . . . grind clearance from point of tooth so back will not contact stock being sawed as blade revolves. This also grinds back of tooth point and produces a sharp cutting point.

SET TEETH (or Swage) to provide clearance for saw body.

BEVEL GRIND face and back of tooth if saw indicates this operation is needed. A bevel ground tooth will cut with less power, but will loose its set and cutting edge quicker than the same tooth without bevel.

Speed is the real objective with your Sharp-All but it will come only with practice. Never try to gain speed by taking off too much metal at one pass — do not burn teeth by severe grinding.

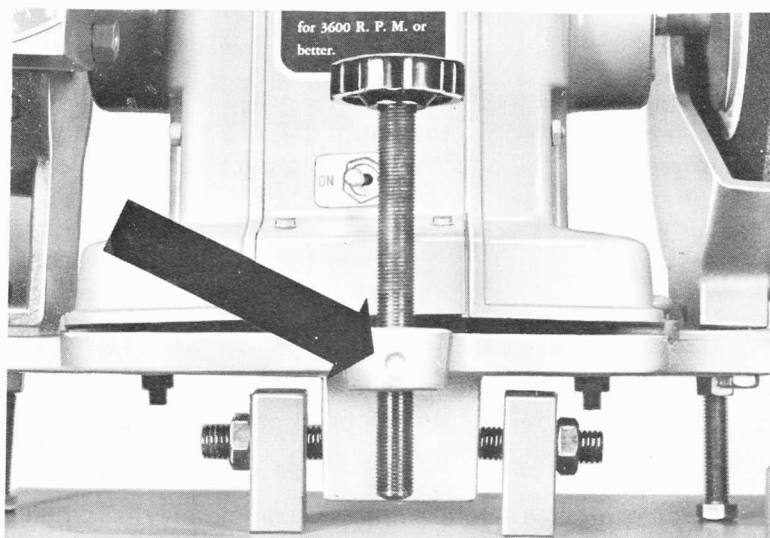
T-340B FEED SCREW ADJUSTMENT

If you find that you are having difficulty maintaining depth of gullets, or that your saw blades are not jointing down to a true cutting circle, it may be that the T-340B Feed Screw is vibrating out of adjustment.

If so, notice in the picture below that directly in front of the threaded hole for the Feed Screw in the T-251P Motor Pivot Base, there is a slight indentation. In this indentation there is inserted a Nylon Plug which extends into the threads of the Feed Screw.

Take a set punch or a nail, place it in the middle of the indentation and strike it with a hammer or mallet. This forces the nylon plug into the threads of the Feed Screw and will not allow it to vibrate loose. Strike the plug lightly at first, and repeat as many times as necessary to obtain the proper tightness.

Any time the adjustment of the Feed Screw loosens, you can reset the Nylon Plug, following the above instructions.



PRACTICE EXERCISES — RIP SAWS

Start with an old worn 8-in. or 10-in. rip saw. Place it on the saw locating stud, teeth pointing clockwise. Bring center of motor arbor level with saw at grinding position, (Fig. 1, page 8). Plan to rotate the blade counter clockwise with the **RIGHT** hand. Use gummer wheel that is slightly narrower than the gullet; 3/16" size is a good one for practice.

Dress wheel to angle shape as shown in sketch. The advantage of the angle-shaped wheel is that you can work **DOWN** face of one tooth, into depth of its gullet, without accidentally "nicking" back of next tooth. Then, as you rotate saw, the angle on face of grinding wheel will nearly duplicate shape desired on back of following tooth. You can grind on up back of tooth with less danger of "gouging."



Do not try to remove too much metal . . . contact the saw tooth lightly with the gummer wheel. Never apply enough pressure to heat and blue the saw blade.

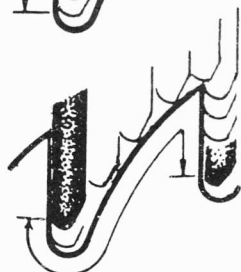
Try different positions with your **RIGHT** hand on the saw blade until you arrive at one position that will be most convenient and comfortable for you.

Figure 1



With your **LEFT** hand on the handle, pull straight down the face of tooth and back out again. Grind where we have indicated in the sketch **BETWEEN ARROWS ONLY**. Repeat this until you can run every tooth on the saw in 5 minutes or less.

Figure 2



In addition to operation in the Figure 1 exercise, bring the wheel out along the back of the next tooth. Continuous practice of this combined exercise will very soon enable you to get completely around the saw in 10 minutes.

Practice any part of Figure 1 or Figure 2 exercise on which you may be a little slow. The secret of the most profitable use of your time and the best quality workmanship is **SPEED**.

Do not become discouraged if you butcher the teeth on your first practice runs. A little practice will overcome that trouble fast. Remember, the most important thing is to control the saw blade, with your *right* hand. Next, it is important to be sure and move the wheel clear of the teeth when rotating the saw to the next tooth.

Figure 3



If the back of the tooth looks like this sketch, you are using too much pressure with the left hand and need to turn the saw **FASTER** with your right hand.

It will probably be several trial runs before you can expect to completely **JOINT**, **GUM**, and **SHARPEN** and **SET** an 8- or 10-in. saw in 10 minutes or less as experienced Sharp-All operators do. However, even if it takes you an hour to complete your first saw, you can expect practice to quickly bring your time down to 15 or 20 minutes.

After you have mastered the practice exercises, you are ready to completely resharpen your first Rip Saw. Jointing is the first step.

JOINT AND GUM A RIP SAW (STYLE A & C)



Figure 1



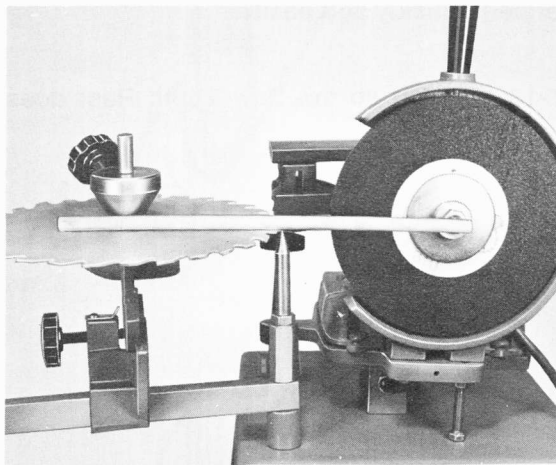
Figure 2

Joint down to dotted line as shown in above sketches. This will bring the saw to true round with every tooth point in cutting circle. For saws over 16-in. diameter let motor weight hold gumming wheel in **BACK** position. For smaller saws slide Saw Arbor back along Base Arm to point where you can hold gumming wheel against forward stop on Feed Screw. Use 1/4-in. or wider face gumming wheel. Grind the longest tooth first, turning saw clockwise with right hand and holding wheel in position with left hand. Go clear around the saw. Turn Feed Screw clockwise for slight advancement of the wheel and grind slightly each revolution of the saw. Move saw locating stud to threaded offset hole in Tilting Arbor when grinding saws below 6-inch diameter.

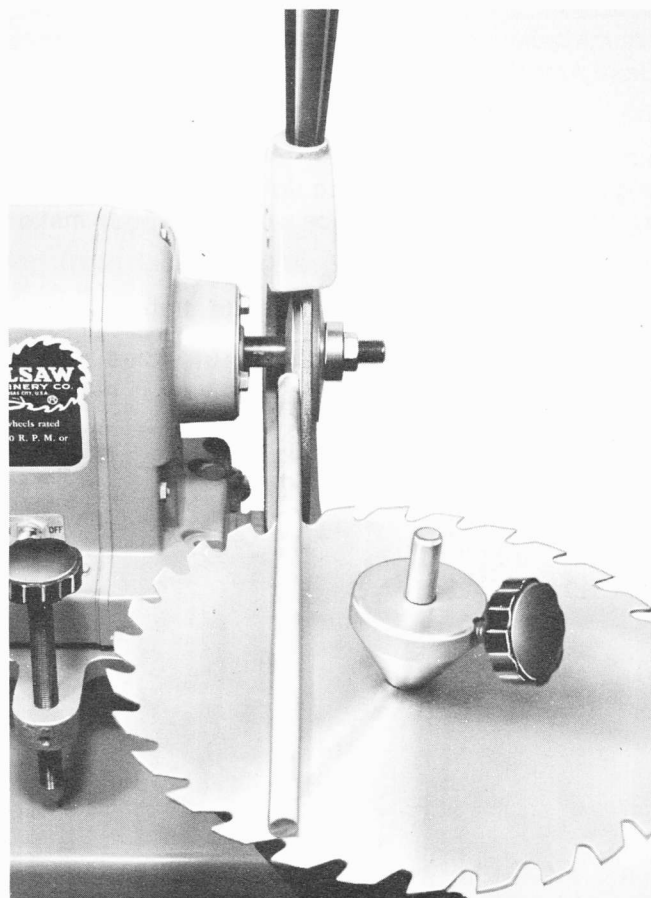
HOW TO GET THE PROPER FACE HOOK ANGLE

Figure 2

Figure 1



LEVEL CENTER OF
MOTOR ARBOR WITH
SAW IN GRINDING POSITION



After jointing the saw, move the Saw Arbor Assembly to the position shown in Fig. 1. Place a straight edge flat against inside face of gumming wheel and on top of blade. Now, move the Base Arm to bring straight edge to desired distance between eye and rim. A simple way to get the standard one-third hook, as illustrated in Fig. 2, is to move the Base Arm until straight edge from wheel is at a distance to left of eye equal to one-fourth of the saws' diameter. For example, on an 8-inch rip saw, this line would be 2-inches from the eye. For other styles of blades, move the Base Arm to the **RIGHT** for **MORE** Hook Angle, and to the **LEFT** to **REDUCE** Hook Angle. Once you have obtained the desired hook angle, tighten the Base Arm Lock with a wrench to maintain this position.

SAW TOOTH REST (T-305, Key 33)

The Saw Tooth Rest is the pencil shaped part that is located immediately in front of the Grinding Assembly. You will notice it has threads on one end of it. These threads have a two-fold purpose. First, it allows it to be screwed in and out of the Base Arm Lock (T-302, Key 32). Second, it allows a nut to be screwed onto it. This locks the Saw Tooth Rest in position after proper adjustment has been made.

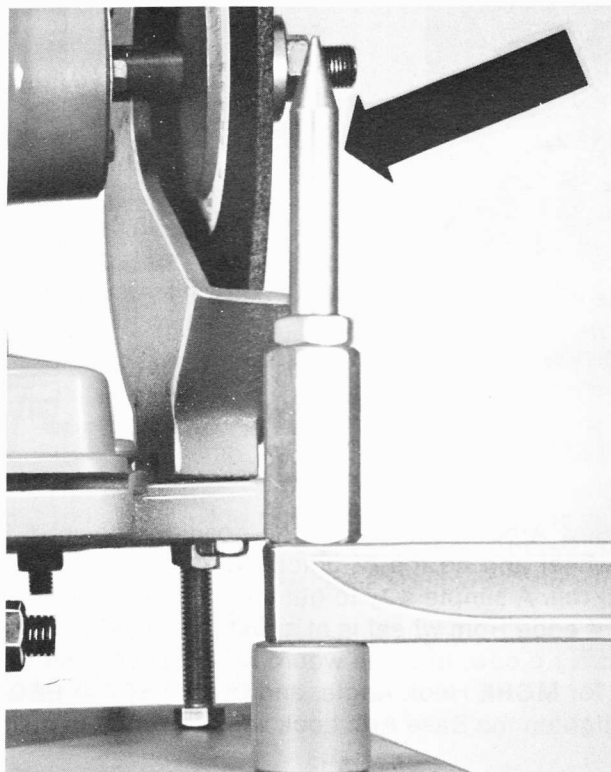
The purpose of the Saw Tooth Rest is to keep vibration and chattering to a minimum while you are grinding. I'm sure that at some time or other you have placed an object to be filed in a vise with the part to be filed too far from the jaws of the vise, and when you proceeded to file the improper support allowed the part to vibrate and chatter. If you moved the object closer to the jaws of the vise, there was enough support provided to allow the file to do its proper cutting action.

The Saw Tooth Rest provides the same support that you get when you place an object as close to the jaws of the vise as possible.

Depending on the diameter and thickness of the blade to be sharpened, it is sometimes not necessary to use the Saw Tooth Rest. On saw blades up to about 6" in diameter, there is enough support provided for the blade by the Saw Arbor Assembly (T-299, Key 18) to keep it from vibrating, in which case you can remove it by screwing it out of the Base Arm Lock.

When adjusting the Saw Tooth Rest, do not adjust it high enough to cause the saw blade to be hard to turn while you are gumming. It just wants to lightly touch the blade. If it is not adjusted high enough, there will be too much vibration. Practice and experience will allow you to make this adjustment quickly and easily.

After proper adjustment has been made, tighten the Hex Nut (Z-13, Key 34) so the Saw Tooth Rest does not vibrate out of adjustment.



JOINT AND GUM A RIP SAW (Style A & C) HOW TO GET THE PROPER FACE HOOK ANGLE



Figure 1

1. Grind hook angle on face of the tooth. Start below point and go straight in to present gullet. Set Feed Screw at this depth and go around the saw working every tooth the same way.

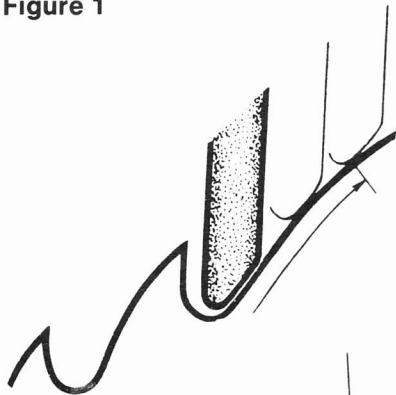


Figure 2

2. Adjust the Feed Screw to stop wheel just short of the gullet. Shape back of tooth by guiding wheel with left hand and at the same time moving saw counter-clockwise with right hand for light grind. Go around the saw. Repeat same operation as many times as required...each time taking only a light cut on remaining teeth that may need additional shaping.

Note: Your best work will result from combining SPEED with LIGHT grinding. Keep saw rotating smoothly so as to avoid "biting" into back of tooth.

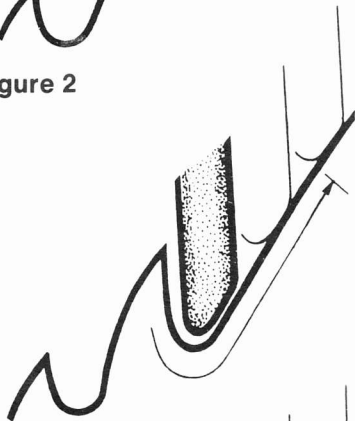


Figure 3

3. Set Feed Screw to deepen gullet slightly. Avoid touching tooth face. Deepen gullet and continue shaping back of tooth.

NOTE: For saws below 10-in. diameter the tooth pitch need not be held more than 1/2 way down from the tooth point.

DRESS GUMMER WHEEL TO retain the angle working shape and remove glaze whenever necessary.

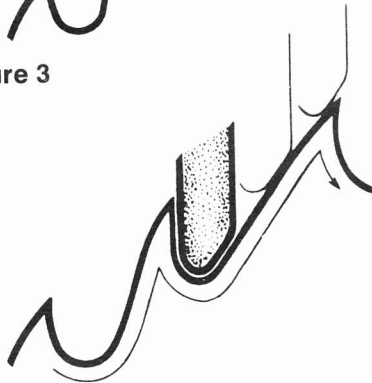


Figure 4

4. Set Feed Screw for final depth which will probably be 1/16- to 1/8-in. below original gullet. Grind entire tooth lightly to give final shape, keen tooth point, and rounded gullet depth desired. Start at the point, pull wheel straight in with left hand to a point about half way down the face, then turn saw slightly with right hand to round down to the gullet's maximum depth. Withdraw wheel while revolving saw blade.

This final shaping should be done rapidly — Keep saw turning with right hand — feed wheel in and out with left hand.

5. Style C only...top grind back of tooth as detailed on page 23.

PRACTICE EXERCISE — CUT OFF SAW (STYLE "N")

Start with an old, worn 8-in. Cut-Off saw. Place it on the saw locating stud with the teeth pointing clockwise and plan to rotate the blade counter-clockwise with the RIGHT hand. If the teeth have been filed, they will probably be unevenly spaced and have sharp corners in the gullets as shown in the sketch below. Position saw as shown (Fig. 1, page 8). Move base arm left for center pitch (a line from point of tooth, along the face, will pass thru eye of the saw).



Figure 1



1. Use $\frac{1}{8}$ - or $\frac{1}{4}$ -in. thickness gummer wheel with the face dressed to a sharp righthand bevel as shown above Fig. 1.



Figure 2

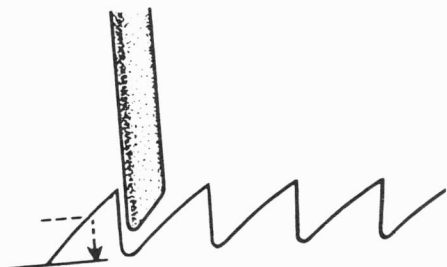


Figure 3



Figure 4

2. Adjust the Feed Screw to stop the gummer wheel just short of the gullet. Now, grind the back of the tooth. Push the saw so that the tooth comes into light contact with the gummer wheel, using your right hand, and at the same time withdraw the gummer wheel from the saw tooth with your left hand. Repeat until you can grind every tooth within 10 minutes. Grind lightly so that NO DISCOLORATION shows on the teeth.
3. With your left hand pull the wheel straight down and grind the face of the tooth. Avoid the point and gullet. Repeat and practice until you can go completely around the saw in about 5 minutes.
4. After mastering above practice operations, adjust Feed Screw to let wheel grind into gullets. Then combine the 2 steps in a single continuous motion as Figure 4. Do not try to complete shaping in one turn around the saw. Grind lightly and repeat around saw until all teeth are finally brought to uniform shape and depth. A good depth for gullet of Cut-Off is $\frac{3}{4}$ of the distance from point to point. If 1-in. between points, gullet should be $\frac{3}{4}$ -in. deep.

JOINT AND GUM A CUT-OFF SAW (STYLE "N")

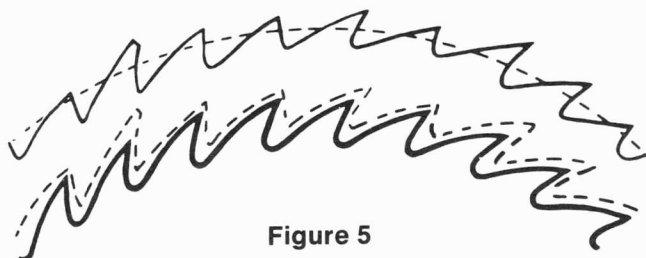
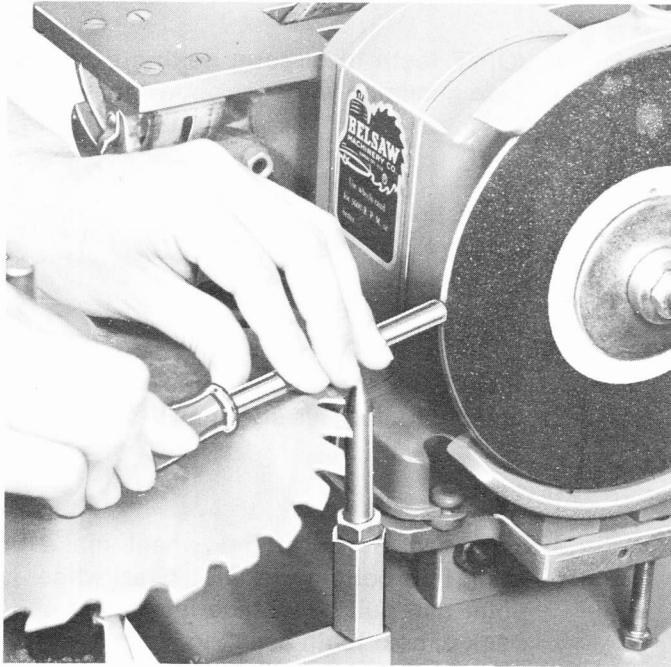


Figure 5

To joint saw into uniform cutting circle, set Feed Screw so that wheel contacts points of longest teeth. Rotate saw CLOCKWISE. Adjust Feed Screw to allow wheel to grind teeth points until all have been brought to same rim circle. Use round face wheel. Joint as far down as required to produce strong new teeth as shown in Figure 5.

JOINT AND GUM A CUT-OFF SAW (STYLE "N") — Continued



Dress $\frac{1}{8}$ or $\frac{1}{4}$ -in. wheel to sharp righthand bevel. Use your practice saw or some other substantial plate on saw arbor as a dressing tool rest. Move wheel dresser toward the center of wheel as pressure on side of thin wheels may cause breakage.

Move saw arbor base arm so left side of gummer wheel lines up with the saw point & eye to give center pitch.

You are now ready to grind teeth as you did on your practice exercises.

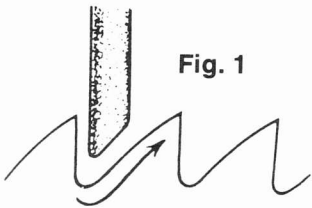


Fig. 1

1. Set Feed Screw to stop gummer wheel just above gullet. Start with wheel in that position and grind up back by withdrawing wheel with left hand and turning the saw blade with your right hand. Teeth will be small so that operation must be fast. Grind lightly to avoid burning the saw blade.



Fig. 2

Fig. 3

2. Set Feed Screw for present gullet depth. Start just below tooth point and grind the face of the teeth by pulling wheel in with left hand. Hold saw blade stationary with right hand. Now rotate saw COUNTER-CLOCKWISE to next point and draw gummer wheel straight in down face.

3. Set Feed Screw for slightly deeper gullet. Combine steps in Fig. 1 and Fig. 2 and go around the circumference of the saw. Keep gummer wheel dressed to uniform bevel.

Should the distance between tooth points vary greatly, you can bring them into uniformity by looking ahead a few teeth. Grind more metal from the face of some of the teeth than others, thus, even this spacing. Do not attempt to do the complete job at one sharpening; it will probably be the third time around before you bring it into tooth spacing you want. A slight difference in tooth spacing has no actual effect on saw performance. However, the good workman will attempt at all times to keep teeth as closely duplicated as possible.

When the saw is jointed, and gullets of uniform depth, and teeth evenly set, the saw will cut straight and true. Uniform distance between points comes with practice, and as your right hand becomes well "educated."

(Bevel grind data is covered in later section)

JOINT AND GUM CUT-OFF SAW (STYLE M)



Figure 1

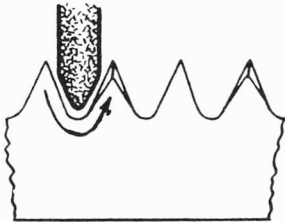


Figure 2

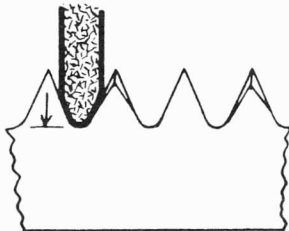


Figure 3

1. JOINT teeth to uniform cutting circle with round face gumming wheel as shown for Style N.
2. Dress $\frac{1}{8}$ - or $\frac{1}{4}$ -in. wheel to sharp "v" bevel as in Figure 1.
3. Move base arm so that wheel is in direct line with point of tooth. This style has V-shaped teeth.
4. Set Feed Screw to let wheel make very light grind into bottom of gullet. Start wheel just below point and pull down face into gullet and up along back of next tooth as in Fig. 2.

Turn Saw with right hand, pulling wheel with left. Avoid wheels touching point when turning saw. Grind lightly, going around saw as many times as necessary to complete shaping of teeth. Adjust Feed Screw to let wheel take light grind in bottom of gullets each turn of saw.

5. Adjust Feed Screw to bring wheel into bottom of gullets far enough to give good room for sawdust clearance. Go clear around saw, pulling wheel straight into gullets until all are uniform depth. Do not let wheel hit any other parts of teeth during this gumming operation. Good average depth of gullet is about $\frac{3}{4}$ of distance between tooth points.

Bevel grind data will be found in later pages of this manual.

JOINT AND GUM COMBINATION SAW-STYLE V



Figure 1

This type combination saw has teeth almost identical in size and shape to "A" Style Rip Saw. It is a popular blade on electric handsaw machines, home workshop and other table saws. Many users find it vastly superior to "S" type saw for ripping. Dress wheel to angle shape as used for "A" and "N" Style teeth.

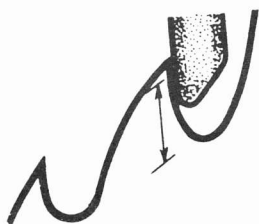


Figure 2

1. Joint to true cutting circle same as other types. Use round face wheel. Motor arbor centered level with saw in grinding position (Fig. 1, page 14).

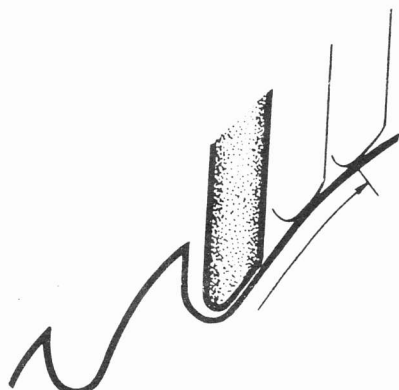


Figure 3

2. Move base arm to give just slightly less than $1/3$ hook angle. Line up wheel to be out from center about $1/5$ of saw's diameter. Start wheel below point and go straight down face into old gullet. Set Feed Screw at desired depth and grind each tooth same. Average depth of gullet can be about $1/2$ of distance between points.

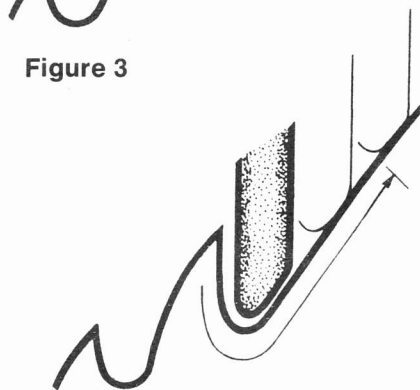


Figure 4

3. Change Feed Screw to stop wheel just short of bottom of gullet. Shape back of teeth as shown in Fig. 3. It is best to grind lightly, going around several times to bring all teeth into same size and shape.

4. Adjust Feed Screw to deepen gullet slightly. Avoid touching face. Go around saw until wheel no longer removes metal from gullets. This should bring new gullet about $1/16$ to $1/8$ in. below old.

Whenever it is necessary to remove considerable metal in grinding watch your wheel and dress it as necessary to remove glaze and keep face round. See "**BEVEL GRIND**" data in later pages.

JOINT AND GUM THE STYLE "S" CIRCULAR SAW BLADE

1. Dress a $\frac{1}{4}$ " wheel to round face. Joint cutting teeth and rakers to uniform cutting circle.

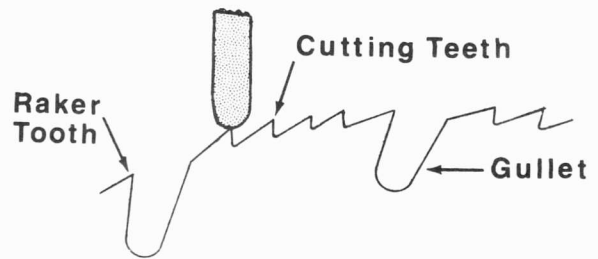


Figure 1

2. Move Saw Arbor Base Arm to give raker teeth 30° hook. Use $\frac{1}{4}$ " wheel dressed to round face. Hold saw stationary with your right hand and pull wheel straight into gullet depth desired. Set Feed screw and duplicate gullet depth around the saw.



Figure 2

3. Joint raker teeth only $\frac{1}{64}$ " below cutting teeth. Adjust the Feed Screw so that it will grind these points uniformly. Pull wheel into gullet opening with left hand and rotate saw clockwise slowly past raker tooth point. Withdraw wheel and rotate saw with right hand to next gullet opening and repeat around saw.

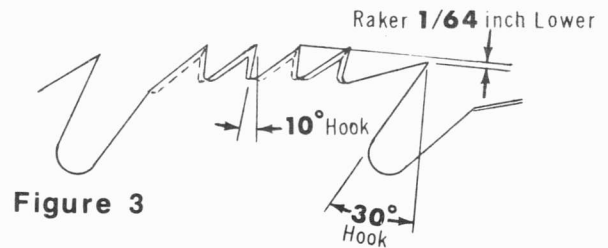


Figure 3

4. Change to $\frac{1}{16}$ " wheel and grind the face, first cutting tooth to new depth. Use the straight edge as illustrated in Figure 4 so that a line running from tooth point on the right to new depth will produce new tooth you desire. Set Feed Screw at this point. Move saw arbor base arm to give cutting teeth 10 degree hook. Grind all cutting teeth, taking care to avoid contact with the tooth points so as to maintain joint.

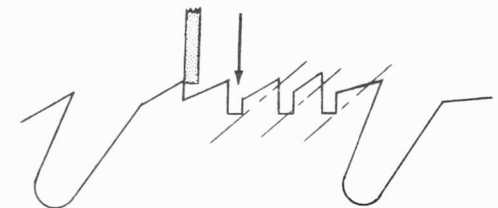


Figure 4

5. **Choice A:** Dress a $\frac{1}{4}$ " or $\frac{3}{8}$ " wheel to sharp right hand bevel. This wheel is to be wide enough and dressed to grind the entire back of cutting tooth. As saw is held stationary with right hand, grinding wheel is pulled straight in. To avoid burning, make two or three grinding contacts to each tooth.

Choice B: An alternate method of grinding the back cutting teeth which is much less likely to burn tooth points. Use the same wheel dressed the same and start grinding the back of the cutting tooth just back of the point. Rotate saw clockwise with your right hand as you pull the wheel in with your left. Set the Feed Screw to duplicate new depth on cutting the teeth all around the saw.

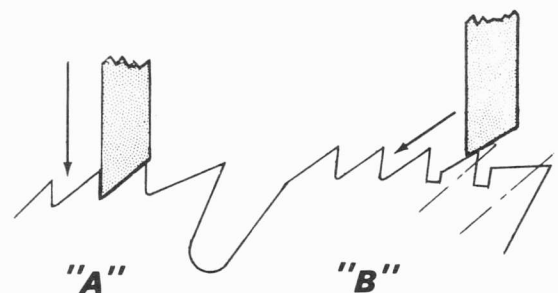


Figure 5

ELECTRIC HAND SAWS

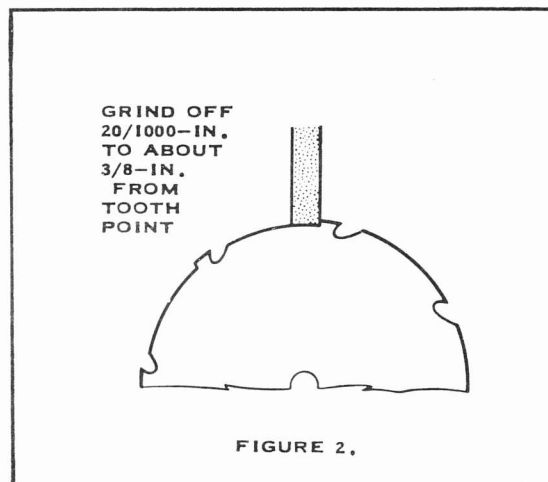
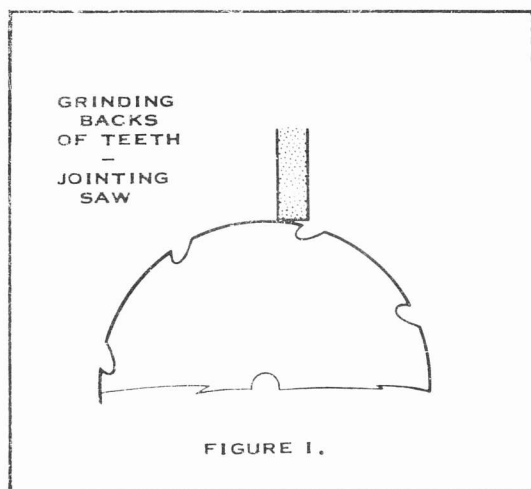
The popular electric hand saws come in various styles and with several different shapes of eye. Your saw Locating Cone will fit the diamond and Square eyes the same as Standard round holes. However, a special adaptor will be necessary for the "long oval" eyes. You can either have these adaptors made locally or send us dimensions so that we can furnish them. Our standard charge for each adaptor to fit these special oval eyes is \$1.50.

When working with RIP or CUT-OFF blades for electric handsaws, joint gum and bevel same as previously shown for these styles.

When working with "C", "V", or "S" Style blades to be used for Combination ripping and cross-cutting on electric hand saws, most users prefer to give the teeth a 15 degree top bevel. See instructions for top grinding.

WIDE TOOTH SPACED "SAFETY" SAW

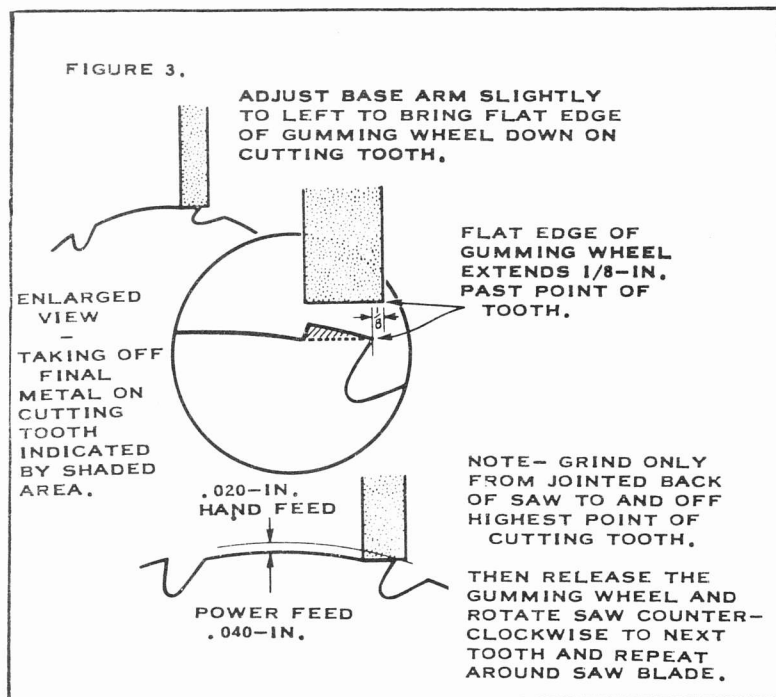
This blade differs from standard in that it uses only 8 to 12 teeth and a top clearance of only .020-in. It requires less power, minimizes kick-back and has fewer teeth to keep sharp. Entire grinding of this saw is best done with a $\frac{3}{8}$ " or $\frac{1}{2}$ " thick wheel dressed to straight face.



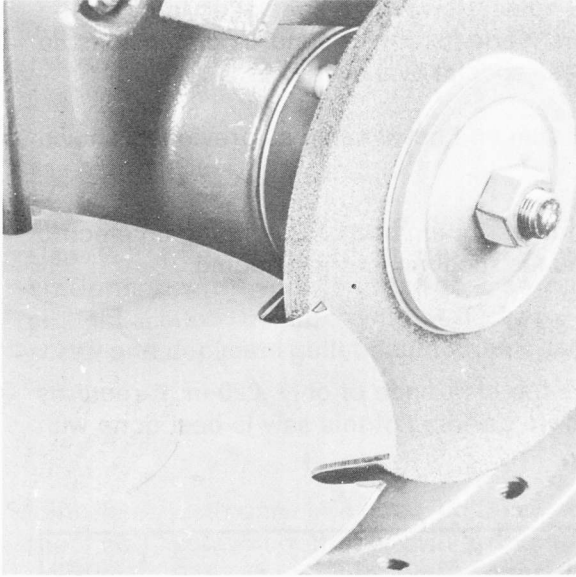
1. JOINT entire rim of saw to uniform circle.
2. Set Feed Screw to stop wheel approx. 20/1000-in. ahead of jointed rim. Mark starting tooth and go clear around saw as shown in Fig. 2 — grinding to within $\frac{3}{8}$ " of each tooth point.

If necessary to deepen gullets, gum same as shown for Style A Rip — using one third hook angle. The teeth are always sharpened straight across and set same as equal gauge rip saw.

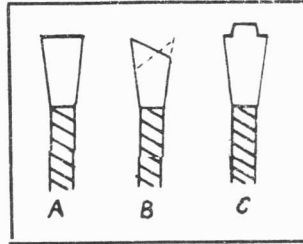
Worn down Style S Combination Saws can be converted to above type by jointing rim below gullets of cutting teeth and then proceeding as in Fig. 2 & 3.



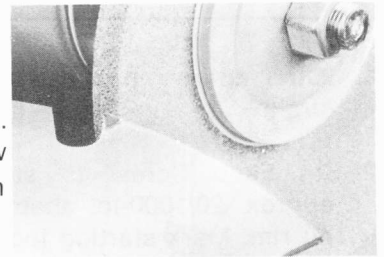
Sharpening Carbide Tipped Saws



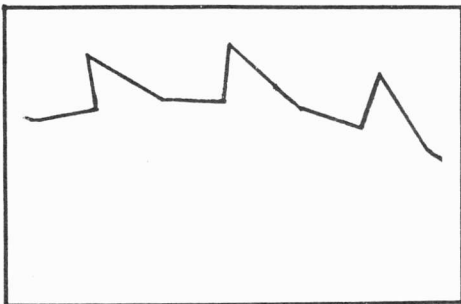
The near prohibitive cost of diamond grinding wheels has discouraged the small operator from learning to care for carbide tipped saw blades. A dish shaped green silicon-carbide grinding wheel will produce a finish comparing favorably with the diamond wheel...and permit you to add this service without extravagant investment.



1. Hold the saw lightly down against the saw rest when grinding carbide tips. This prevents chattering, which has a tendency to flake the cutting edge of the tip.
2. Use green wheel and grind carbide tip only. (Use regular wheel to restore back clearance to tooth and do not contact carbide tip with it.)
3. Move base arm to bring face of carbide tip to grinding contact with wheel. Hold saw in this fixed position and move grinding wheel down face of tip, then back out. Grind remaining teeth using same procedure. Go around the saw many times. Remove such a small quantity of carbide that sharpness will appear about the 5th round. Never allow the tip to get so hot it will burn your finger right after the grinding wheel leaves it. CAUTION: Too much localized heat at the point will melt the bond holding it to the saw tooth, and cause costly repairs. General recommended cutting rate about .00025 inch per pass.
4. Maintain the same angles on the tip the manufacturer used originally. (a-b-c)
5. To grind the back of tips, swing base arm so they contact edge of grinding wheel. Bring wheel forward for repeated light grind as outlined in Step 3. To keep saw jointed in true round, set front Feed Screw and grind each tip at the same place on grinding wheel.

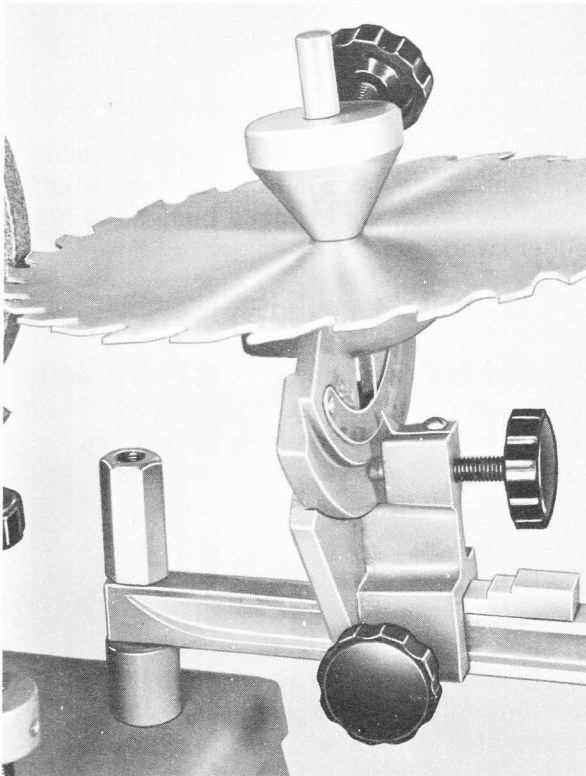


HARD TIP SAW

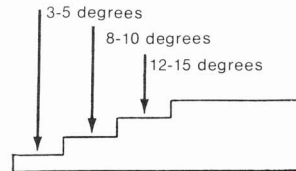


This popular type saw has hardened teeth that cannot be filed. Originally sold to be disposed of after it became dull, you can resharpen it at low cost because it has very few teeth, and does not require setting. Joint all teeth to uniform cutting height. Bevel the gummer wheel to grind the back of the tooth. Use a very light touch as the teeth are small and the point tiny. Avoid heat on the point. Maintain the manufacturer's clearance on the back of the tooth. Touch the front of the tooth very lightly to give the final sharp cutting edge.

TOP GRINDING — Style C Tooth



T-383 BEVEL GAUGE



Exact degree of angle is not listed since this depends on how far Gauge is inserted under base of T-299 Assembly.

(Note: Remove tooth rest if it interferes on certain blades. Do not grind point of tooth and do not extend bevel over 1/2 way along the flat clearance.)

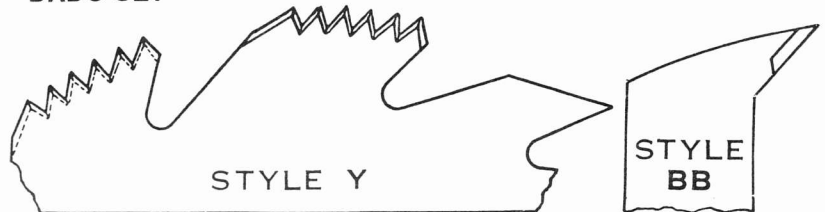
1. Position Tilting Arbor so motor shaft centers level with saw when wheel contacts point of tooth, and joint saw.
2. Use 1/2-inch thick wheel dressed to flat face.
3. Position Base Arm to give desired amount of flat clearance and grind each tooth.
4. Set teeth.
5. Loosen the Hand Control Knob holding Saw Arbor Assembly to Base Arm, and insert T-383 Bevel Gauge between Saw Arbor Base and Base Arm. Use the step that will give a bevel of 12 to 15-degrees. Retighten Hand Control Knob to hold position.
6. Position Base Arm to give saw center pitch.
7. With teeth pointing RIGHT, bevel grind each tooth set DOWN. Line point of tooth with outside edge of gumming wheel and do not grind off the point of tooth.
8. Turn saw over and grind remaining teeth, aligning point of tooth with inside (next to motor) edge of grinding wheel.

BACK BEVEL... Style "A" and "V" Teeth

Follow instruction manual for Jointing and Gumming. Use 3/16 inch or 3/8 inch thick wheel dressed to round face and follow steps 5 through 8 above.

A Dado Set is made up of two or more Style "Y" outside cutters in combination with one or more Style "BB" inside cutters, or chippers. The dado head cuts cleanly in any direction of the wood.

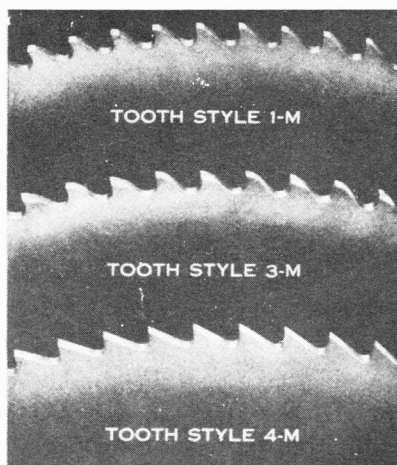
DADO SET



Sharpening a Dado Set requires considerable skill. After you are proficient with the standard rip, cut-off and combination saws, you will be able to service Dado Sets with your Sharp-All as follows:

1. Move Base Arm to give center pitch.
2. Joint both Style "Y" cutters to one uniform rim circle.
3. Dress gumming wheel to very sharp "V" bevel that will produce the cutter tooth with a straight pull into the saw.
4. Tilt saw DOWN (See Step 5 of Top Grinding) to duplicate original angle and grind all the teeth in one bank to bring back their original bevel and sharpness. Avoid tooth points by dressing "V" slightly deeper than the bottom of the tooth. Since point of the wheel does most cutting, dress often. Grind all similar banks around bottom of the saw.
5. Turn saw over and repeat Step 4 on teeth of opposite bevel.
6. Change to 3/16-in. round face gummer wheel, or re-dress gummer wheel to round face. Gum, straight grind and joint raker teeth 1/64-in. lower than cutting banks.
7. Change to straight face ("A") gummer wheel or re-dress gummer wheel to straight face. Grind TOP clearance on rakers.
8. Joint ALL inside chippers to same cutting radius as rakers on Style "Y" saws. Grind slight clearance back of cutting edge.

METAL CUTTING SAWS



Shape of teeth varies with machine and type of cutting. Follow sharpening procedure for nearest similar shape wood saw. Duplicate original shape of gullet and hook angle. Metal blades are hollow ground, requiring neither swage nor set.

Style 1-M is the coarse or square top tooth.

Style 3-M is the more modern formed tooth. This style has every other tooth .012-in. high beveled on both sides. The alternate teeth have a square face and a top clearance angle of 5 to 12 degrees.

Style 4-M is a fine tooth, fitted up sharp.

PRINTERS SAWS

Usually tooth style 4-M, resembling N cutoff.

1. Dress $\frac{1}{8}$ " wheel to sharp right hand bevel.
2. Grind back of tooth just behind point.
3. When gumming is also needed, position blade so wheel grinds face lightly, moves down into gullet and out along back of tooth. Keep saw stationary until wheel has completed cycle, then rotate to next tooth.
4. Take very light cut, repeating several times around saw. Avoid heating, dress wheel carefully.
5. Set teeth in regular way or use No. 4 swage. Use wood pads between teeth and vise.
6. Side dress teeth with file for uniform projection.

SPECIAL PURPOSE SAWS

The beginner should confine his repair work to the popular types of rip, cut-off and combination saws until he can handle them easily and in good time. After mastering these simple types you will be able to take on almost any "Special" tooth shapes.

Always try to have customer bring you a new saw, or template of original teeth so that you can duplicate manufacturer's style when resharpening. With such a guide you will find it easier to service metal-cutting saws than many of the wood cutting styles.

Few small factories using metal cutting saws have any suitable equipment for sharpening their blades. They are a good source of business for Sharp-All operators.

Many factories use this machine for their own special shapes of saw teeth. With experience you can offer this type of "custom" service. Before quoting price on such work it is best to put one blade through completely to find how much time it will take you. Customers naturally expect to pay more for such special sharpening and you will have no trouble arriving at a fair price that will show you a good profit.

SIDE CLEARANCE

"Set" is the common terminology for the method of providing clearance for a saw blade in the cut of material being sawed. A uniform even set is essential for an easy running, smooth cutting saw. The Saw Set assembly on your Sharp-All makes it possible to get uniform desired set on all circular saws. For saws under 8-in. in diameter and over 28-in. move Saw Set assembly between Tilting Arbor and Saw Tooth Rest.

Improper clearance (set), besides jamming and binding during operation, may cause a blade to overheat and cause cracking which may render the blade dangerous for further use. The blade also will not cut true, pulling to the side on which there is a greater amount of set.

There are three methods for providing this clearance in the cut. They are; (1) Spring Setting, (2) Hollow Grinding, (3) Swaging.

- 1. Spring-Set:** This is the most common method of setting, and the type for which you use the T-386 Saw Set Assembly on your BELSAW. See Figure 1 below. Notice that the teeth are bent alternately right and left. This is done either with a hand tool or in our case by extending the tooth over the anvil the desired amount, placing the set punch on top of the tooth and striking it with a bench hammer. As you can see, the farther over the beveled anvil the tooth is extended the greater the set will be and the wider the cut.
- 2. Hollow-Ground:** See Figure 2. Although the drawing below is exaggerated for illustration purposes, this is the method used to provide clearance in hollow-ground blades. Notice that the thickness at the rim and arbor is much greater than in the body of the saw. You can see that if you sharpened down too far or if the blade has been sharpened too many times, there will no longer be clearance in the blade.
- 3. Swage-Set;** See Figure 3. Similar to hollow-ground, but only the teeth are larger than the body of the saw. Various methods are used to spread the teeth, but most commonly a hardened steel die is placed over the tooth to be swaged and struck with a hammer or a mallet. Carbide-tipped blades are swaged, but rather than being manually spread, the swage is ground into them with carbide grinding equipment.



Fig. 1

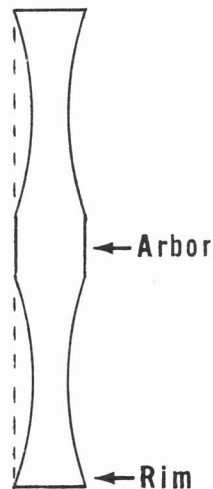


Fig. 2

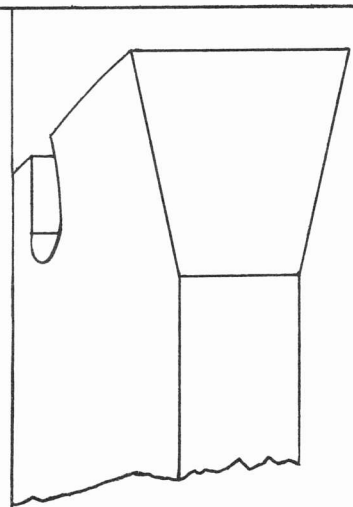
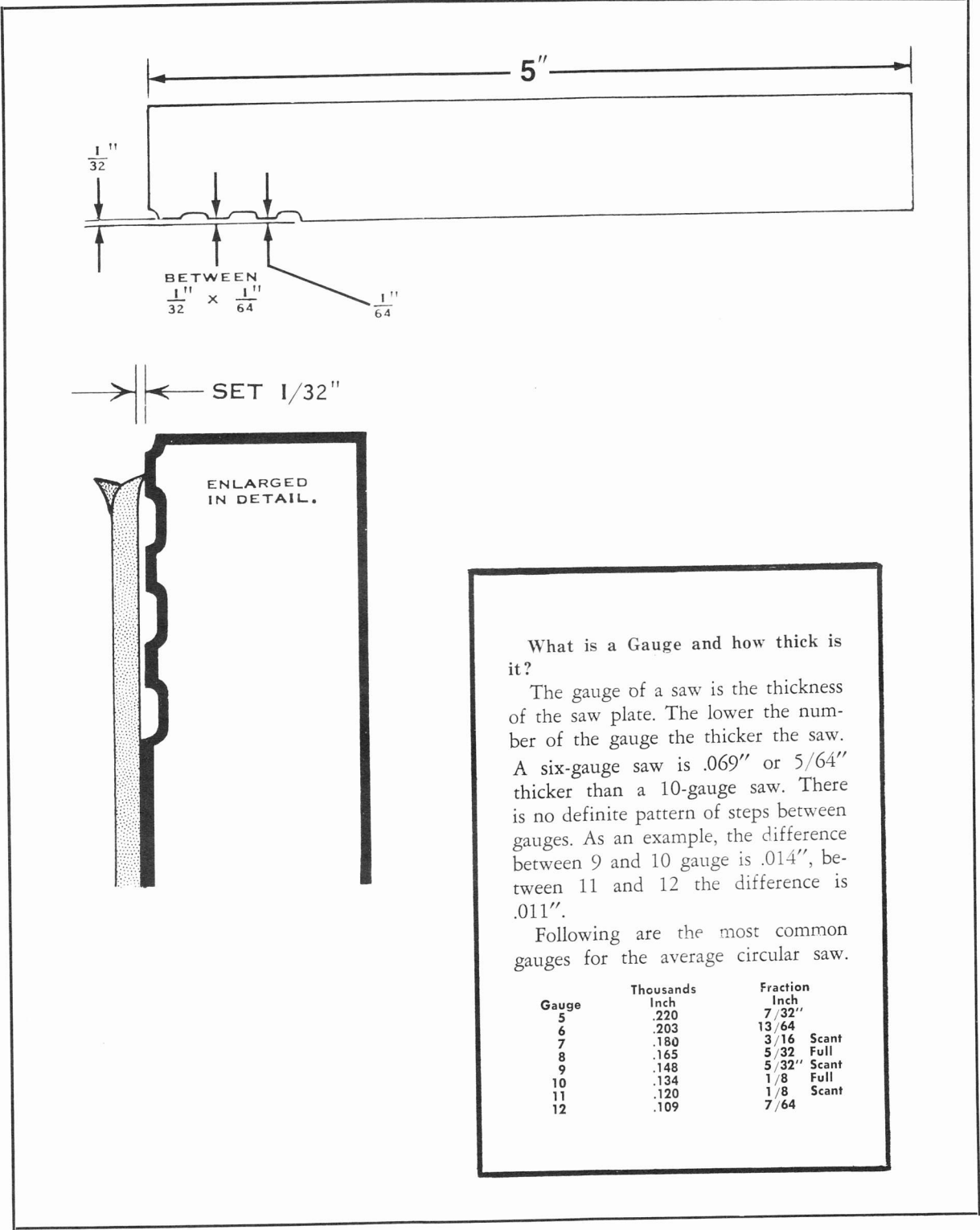


Fig. 3

A set gauge as shown in Figure No. 4 is fairly simple to make from light sheet metal and can be used to measure set as indicated at left. A "feeler" gauge such as used in adjusting spark-plug gap will help you to obtain the three check-points ($1/32''$, $1/64''$ and midway) when making this type of set gauge. Experience will equip you to decide on proper set by eyesight alone.

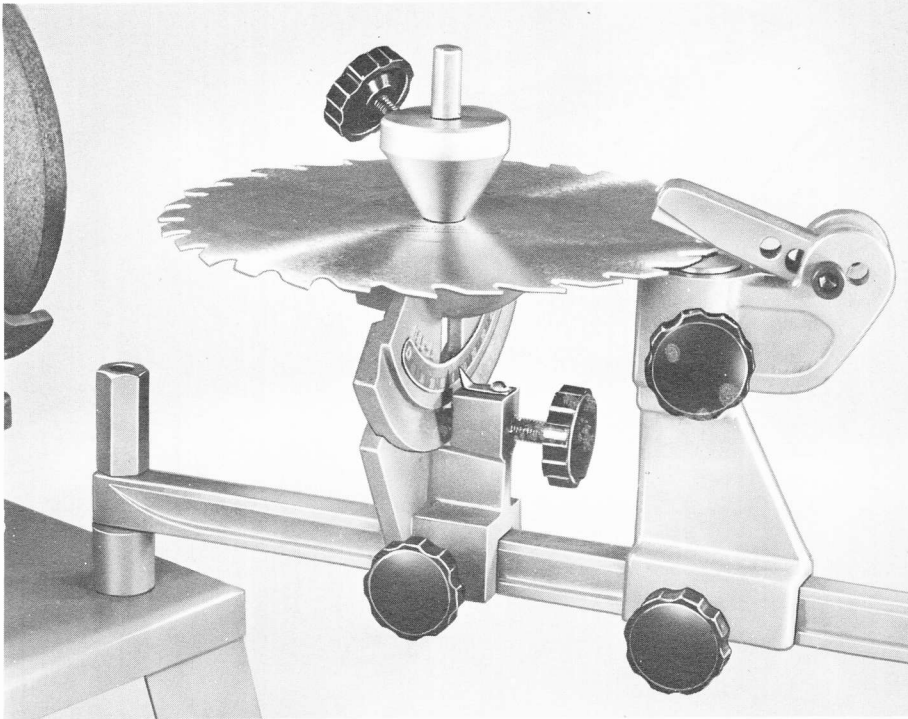
Figure 4



SETTING A SAW

OPERATION: Mark the first tooth to be set, using chalk or crayon, and also the following tooth on the opposite side of the saw as a guide for starting to set teeth. Place the saw blade on the Saw Arbor and lock the Locating Cone in place to hold rigid. When setting light gauge blades, position Saw Arbor on Base Arm as close to Floor Stand as possible for maximum support during the setting operation (See Figure 1). When setting heavy gauge blades we suggest reversing this position, placing the Saw Set Assembly as close to Floor Stand as possible. With Saw Arbor Assembly in desired position, tighten Hand Control Knob in Base.

Figure 1

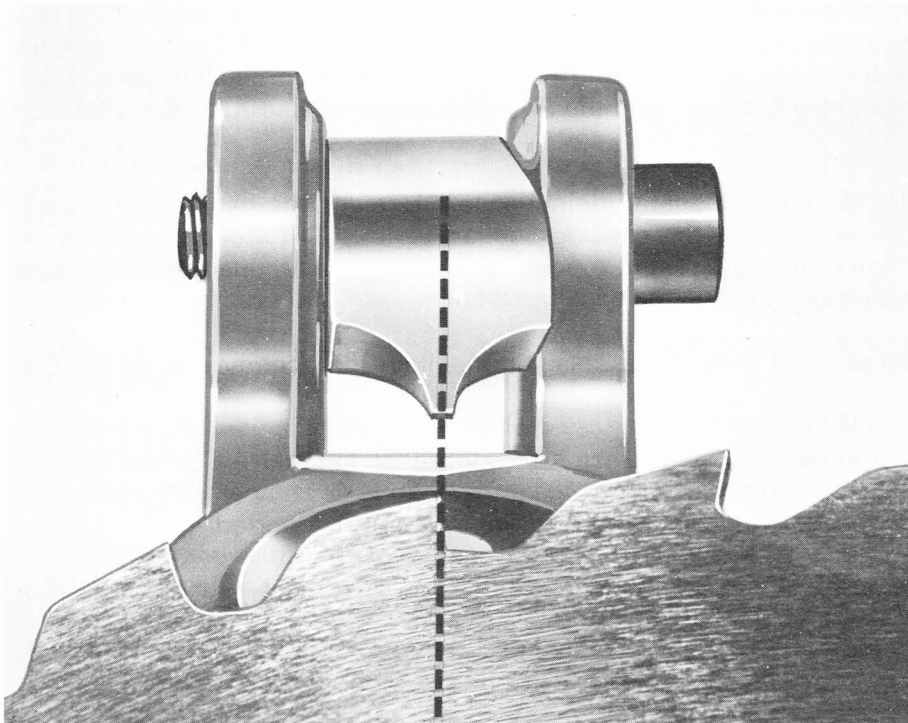


1. Move Saw Set Assembly along the Base Arm to bring tooth point over Anvil $\frac{1}{4}$ distance down the tooth for trial set. Tighten Hand Control Knob to lock Saw Set to Base Arm.

2. The amount of set will depend on the distance the tooth extends over beveled face of Anvil, and the side of Anvil used (see Step 5). If Saw Set and Saw Arbor are positioned as in Figure 1, for MORE set, you would move Saw Arbor to RIGHT, and to LEFT for LESS set.

3. Adjust the Saw Set Guide so the Set Punch is in direct line with the face of the tooth as shown in Figure 2. Tighten the Guide in this position.

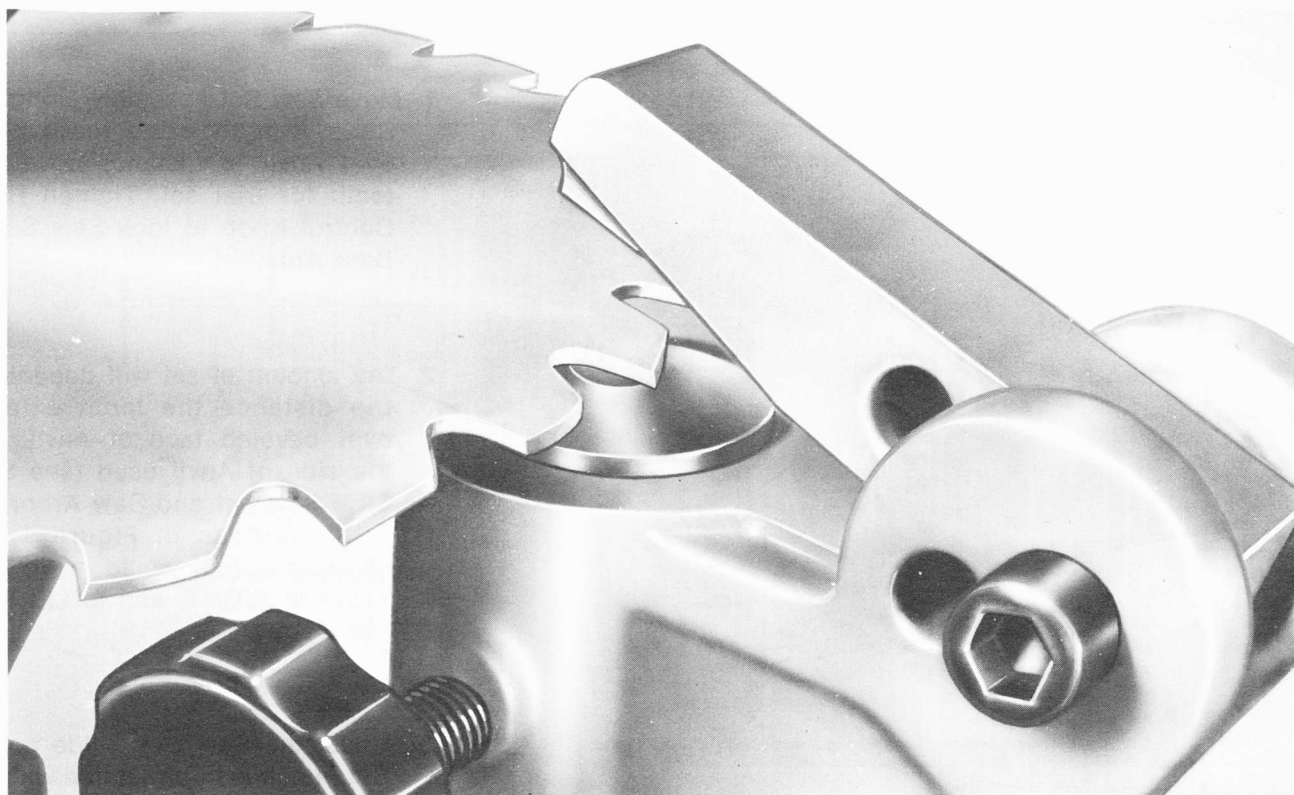
Figure 2



4. Inspect the Set Punch and notice that it tapers from the tip into a wider base. Note also that the Anvil is beveled on both sides, one side having a 17.5-degree angle, and the other 12.5. These features allow you to set very tiny teeth, as well as very broad teeth.

5. For saws that require a greater amount of set, use the side of Anvil having the 17.5-degree bevel. For saws requiring less angle of set, use the 12.5-degree side of the Anvil. When using the 17.5-degree bevel, the Set Punch is located in the hole in the Guide *nearest* the Anvil. For the 12.5-degree angle, use the hole *farthest* from the Anvil. For fine tooth saws, the Punch is adjusted back so that it contacts at the narrow tip of the Punch face. For coarse tooth saws, the Punch is adjusted forward so that you can use the wide face of the Punch.

Figure 3



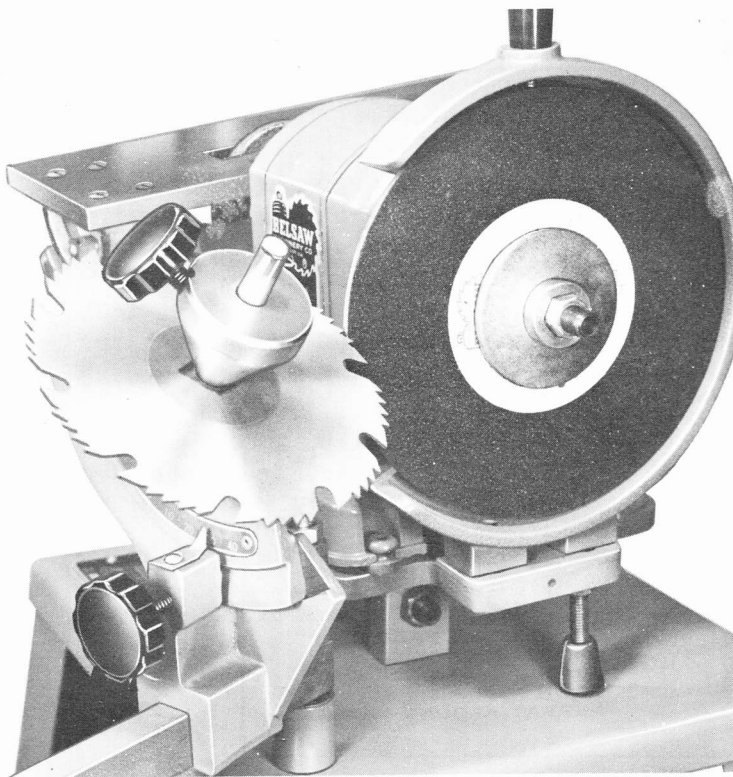
6. After determining Anvil and Punch setting, strike Punch a sharp blow with hammer. Check this trial tooth to see amount of set produced. Bring tooth point ahead over Anvil for MORE set, or back for LESS set. Do not set over 1/3 length of tooth on saws over 8-inches in diameter, and not over 1/2 length on smaller saws. After getting first tooth in position with desired amount of set, lock the Saw Arbor to the Base Arm. Set alternate teeth.
7. On Style 'S' Combination Saws, set cutter teeth to duplicate original style. Start with the back tooth in each section. Most manufacturers prefer to bend tooth in the starting section to the LEFT, following teeth on alternate sides. Then, start the next section to the RIGHT and repeat. However, there are manufacturers that start each section the same. Do NOT set the raker teeth.

Check all Hand Control Knobs occasionally to keep them tight. This will maintain the accuracy of your initial settings.

If you have a bench-mounted Sharp-All, the outboard end of the Base Arm is threaded to receive a 1/2-inch Socket Head Cap Screw. This Cap Screw is inserted from the bottom side so that the head is down against the bench. It is adjustable to compensate for unevenness of the bench so that Base Arm will be solidly supported.

For setting saws under 6-inches in diameter, relocate the Saw Locating Stud using the off-set threaded hole provided in the Tilting Arbor.

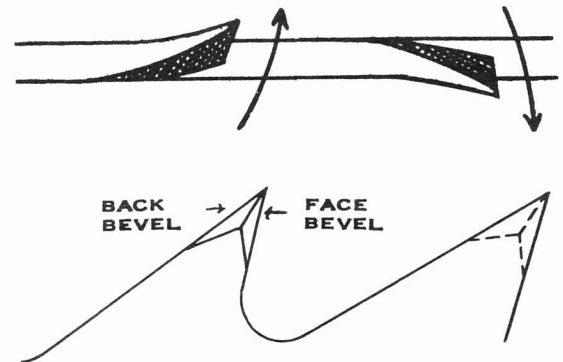
If, after prolonged use, the beveled face of the Anvil becomes worn, it can be rotated in its socket approximately one-third so that you can set saws on an unused surface.



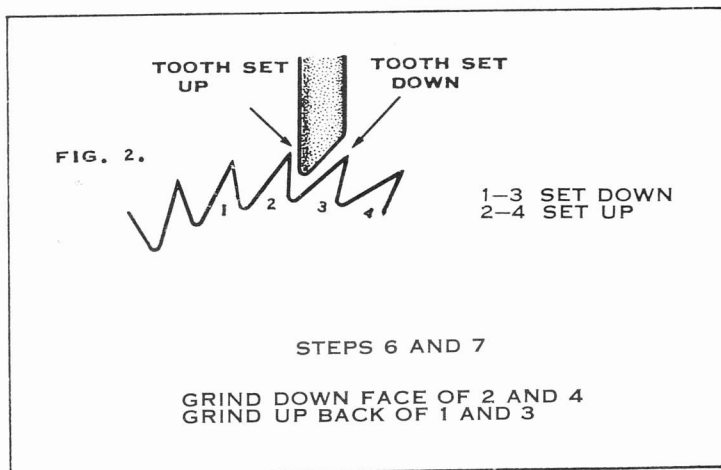
BEVEL GRINDING

Photo at left illustrates the proper setup for Bevel Grinding, with Tilting Arbor to RIGHT.

The bevel is ground on the opposite side to which each tooth has been set, as is indicated below. Use care to grind bevel ONLY. Do not hit point of teeth.



STYLE N and STYLE S Cutting Teeth

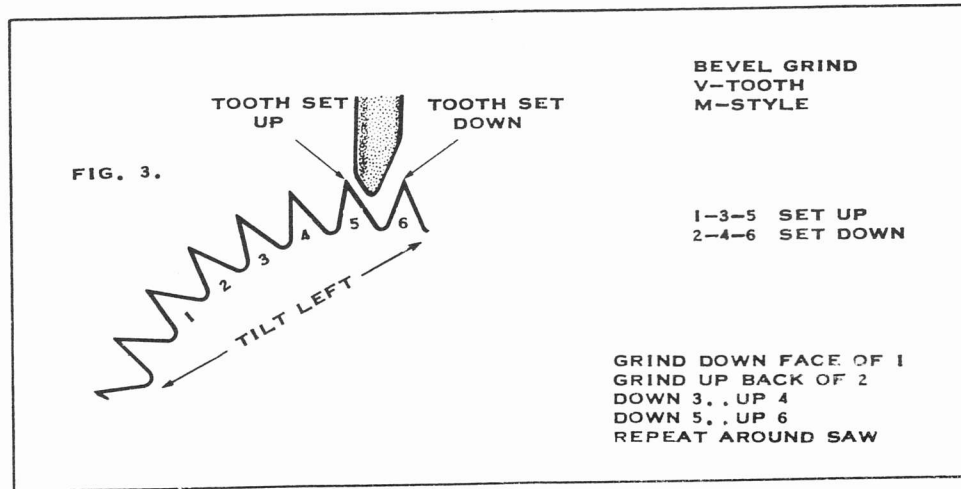


1. Dress $\frac{1}{8}$ or $\frac{1}{4}$ -in. wheel to sharp right bevel. Make sure to shape so right edge of wheel does not hit back of tooth next to one on which you are working.
2. Move Base Arm to give center pitch hook angle.
3. Tilt Arbor to left 10° .
4. Chalk first tooth with set pointing UP.
5. Set Feed Screw to stop wheel about one-third short of bottom of gullet.
6. Bring wheel into face of UP — set tooth and take light grind down to stop.
7. Starting at forward stop, grind UP back of next tooth. Avoid hitting points. Pull wheel clear of point when turning saw to next UP — set tooth.
8. Continue down face of teeth set UP and up back of teeth set DOWN clear around saw.
9. Tilt saw to right 10° and chalk mark first tooth set DOWN.
10. Grind as on other side — except start down on the face of teeth set DOWN and continue grinding up back of the UP — set teeth.

It is important to avoid grinding points of the teeth. Always inspect teeth after finishing the bevel grind to be sure that cutting edges are clean and sharp. Be sure points are high enough to provide back clearance... remember that only the sharpened points can do the cutting so the point must enter the cut first.

CUT OFF SAW BEVEL "M" STYLE

Dress wheel to v-shape shown in Fig. 3. Make angle sharp enough to give side clearance.



1. Move Base Arm so that wheel lines up thru center of tooth to eye.
2. Tilt Arbor to left 10°.
3. Chalk mark first tooth with set pointing UP.
4. Set Feed Screw to stop wheel about 1/3 short of gullet.
5. Bring wheel DOWN face of UP-set tooth and UP back of following DOWN-set tooth, rotating saw with right hand.
6. Pull wheel clear of point and turn saw to next UP-set tooth. Continue as in 5.
7. After going clear around saw as in 5 & 6, tilt saw to RIGHT 10°, and chalk first tooth set DOWN.
8. Grind as on first side — except start down on face of teeth set DOWN and continue grinding up back of following UP-set tooth.

BEVELING RIP SAWS

You will do your customers a favor by suggesting they forget bevel on their rip saws. Rip teeth work best when ground straight across so they can chisel their way through the wood.

Bevel was developed in rip saws to make up for a lack of adequate power to keep the blade turning at its proper speed. When a customer insists on bevel, try a slight back bevel first. Excessive bevel causes lateral motion that results in chatter, vibration and rough cutting.

Certain special rip saw applications have been developed to use both back and face bevel...directions outlining the procedure for both are given on Page 17.

SAW FILING

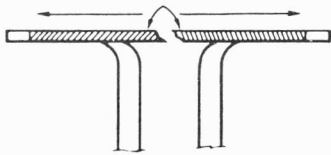
The Sharp-All brings mechanical perfection to saw sharpening. It replaces the labor and slowness of hand filing of saw teeth, and it should take you but a very few minutes to prove to your own satisfaction that producing saw teeth with a file is the hard way to do it.

Many experts who grew up as saw filers insist on hitting the back of the point with two strokes of the file. It gives the same effect as honing a planer blade, and adds a finishing touch. It is the first thing that many users do when they receive new saws from the manufacturer, and it indicates that you are giving them that little "extra" touch, although it is not needed.

Your filing will actually be your final inspection check-up of your Sharp-All work. Just use one or two cuts across the teeth, and that should usually be all that is necessary on the teeth.

Best Saw files are 6 or 8-in. Cant Saw File for fine tooth saws, 8 or 10-in. Mill Bastard File with 2 round edges for coarse tooth saws.

FILE WITH THE SET



File every other tooth on one side all around the saw, *with* the set. Then reverse saw in vise and file every other tooth on opposite side.

DO NOT FILE GULLET



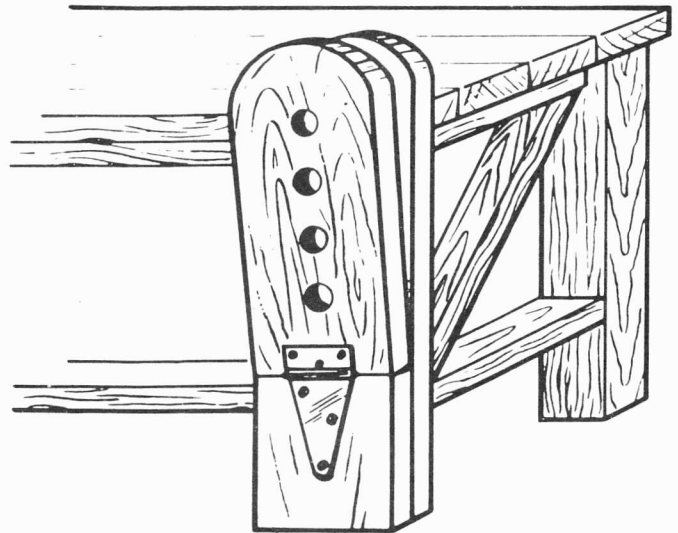
File must not get into tooth gullet because it may leave sharp corners that will cause saw to crack.

Maintain original tooth shapes as we have illustrated and explained in the foregoing. If you file on the top of the point, be sure to do this carefully so that it does not go below the back. If you hit the face of the tooth, do not change the hook angle.

Here is a SAW Vise you can make to fit available space in your own shop.

Material required are two pieces of 2-in. x 6-in. x 3-ft. boards, as shown in the sketch. The outside board cut and hinged. Holes are to be bored 2-inches apart.

The Saw Vise shown here consists of two "jaws" the back of one solid; the front hinged. Holes 2-in. apart provide for mounting blades of various diameters.



Inside face of movable jaw should have a leather "brake" so working tension can be maintained. A bolt with a thumb screw draws the jaws together.

This vise can be attached to any bench sturdy and at convenient height.

HAMMERING CIRCULAR SAWS

Because of the extreme skill required, the average saw shop operator makes no attempt to hammer or adjust the tension of saws. He is better off to refer such work to an experienced sawsmith.

However, both as a matter of general interest in your work and to help you in detecting such defects in the saws brought to you, it is well to understand the meaning of saw "tension." The tension in a circular saw is the expansion of the metal between the collar and the rim. The sawsmith hammers the blade so as to allow for the centrifugal force created by the saw when running at its full speed and the rim strain created by the teeth in cutting

Saws are known as stiff or open, depending upon the degree to which the body of the saw is expanded, as compared to the rim and the center. To measure the tension, the sawsmith uses a tension gauge (a straight-edge ground with a convex edge). He uses special saw hammers and a crown face saw anvil.

While the hammering for tension should be done only by an experienced sawsmith, it is entirely possible for anyone to flatten a saw by taking out lumps or ridges with only a reasonable amount of practice. Lumps are round spots out of flat with the rest of the saw. Ridges are the same as a lump, except that they run parallel to the rim. These lumps and ridges will be detected by simply laying a straightedge at 90 degrees to the radial line between the collar and rim.

After marking these lumps and ridges with chalk, the saw should be laid flat on a slightly oval wooden block. Working on the high side of the blade, simply hammer the lumps and ridges flat. This work can best be done with a crosspeen hammer on the ridges and a round-faced hammer on the round lumps. When this flattening is carefully done on a wood block the hammer blows will not change tension of the saw. The saw should never be hammered on the anvil except by a smith as allowance must then be made for the changes in tension produced by the blow of the hammer.

Encourage your customers to bring their saws in for resharpener as soon as they become dull, instead of continuing to force them to operate in bad condition which will lead to some of the serious troubles we have touched on here.

SETTING YOUR PRICES

Saw sharpening charges vary from 10¢ to 20¢ per inch of diameter: For example:

8" Saw jointed, gummed and set from 80¢ to \$1.60
10" Saw jointed, gummed and set from \$1.00 to \$2.00

Carbide tipped saws average 35¢ per tooth
the following minimum prices for standard sharpening

6"	\$2.80	12"	\$5.00
8"	3.95	14"	5.60
10"	4.50	16"	6.25

For bevel resharpener add 1/3 to above prices.

Many operators charge 10¢ per inch for jointing, grinding teeth and setting, then add 5¢ to 10¢ per inch when necessary to gum the blade. This encourages customers to bring the saw to you before teeth are worn so badly as to require gumming.

NOTE: These prices vary according to locality within the U.S.A. Check with other Sharpening Shops within your area to set correct prices.

INSTRUCTIONS FOR EDGE TOOL GRINDING

The Tilting Table is controlled by three adjustments:

No. 66 Pivot Screw holds table at bevel grind setting.

No. 69 Feed Screw raises and lowers table.

No. 71 Lock Screw locks the bevel grind setting and steadies the table. To tilt the Table, loosen No. 71 Lock Screw and No. 66 Pivot Screws. Adjust table to desired bevel grind and tighten No. 66 Pivot Screw first, then No. 71 Lock Screw. (If pivot segment tends to bind while you are tilting the Table, lift up on support bracket at the same time you move Table.)

Most tool grinding is done with the aid of the Tool Holder. This supports the tool and holds it in constant relationship to the grinding wheel. Repeat grinds are on the identical bevel, and you produce truly professional appearing work as well as sharp edges. These same grinds freehand require considerable skill and practise.... with your Belsaw Tool Holder you turn out this high type work from the beginning

The Tool Holder Clamp is machined with a lip on one edge. The lip is turned down and combines with a milled recess in the Tool Holder Base to hold straight jointer and planer knives at a 15° grinding bevel. On the opposite side of the Clamp two shoulders are milled to act as guides for plane irons and similar long tools.

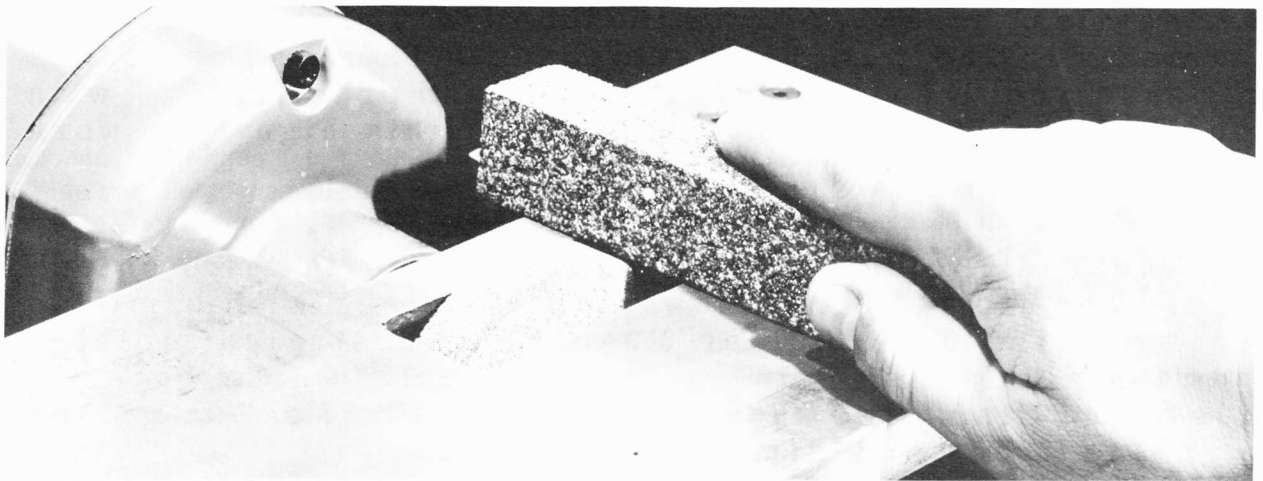
Turn the clamp with the shoulders down when grinding those tools. This same position of the Clamp is used when you are grinding butcher knives, scissors and similar tools. Pressure against the Clamp is exerted by thumb screws. To multiply their power, tighten one first bringing it down so the other end teters up slightly, Then tighten the second. The Tool Holder Base allows clearance for tool handles as they move across the Table and provides a base for upright bolts.

For straight line grinding, run upright bolts through holes in Clamp and holes in arms of Tool Holder Guide. The selection of holes in the Guide permit you to position the tool in relation to the grinding wheel for the grind you want on that particular tool. Use light pressure against Guide as you move Holder to avoid rocking the tool.

In the detailed instructions on following pages, recommended Tilting Table settings are given for each tool.

Your grind is determined by the setting of No. 69 Feed Screw, the pressure you exert against the grinding wheel and the speed you move the tool across the wheel. We recommend light grinds, repeated as necessary to remove the least amount of metal required to bring up a new cutting edge. With light grinds there is less chance of burning and with some tools, removal of too much metal will reduce their cutting efficiency.

Dress your grinding wheels when they are installed on the motor arbor. To operate efficiently the grinding wheel must run true, and the cutting surface be kept in good condition.



Truing always dresses the wheel but dressing a wheel does not necessarily make it true. Grinding wheels are trued to make them round and parallel so they will run without vibration. This operation removes the protective glaze that the factory puts on and exposes the proper grinding surface. When truing a wheel, take a number of light cuts rather than a few heavy cuts. It is much easier to hold the dressing tool steady by removing a small amount. A diamond dressing tool is generally preferred for truing the wheel because it cuts faster than a dressing brick, although either tool will do the job. You can steady the dresser and assure straight travel by holding against the Tool Holder as illustrated in detail instructions for grinding Screw Drivers. True both the face and the sides by moving the tool straight across them.

As grinding proceeds, the wheel cutting surface becomes clogged with metal from the tools you are sharpening or the abrasive grains become dull. The sharp free cutting surface of the wheel is restored and the grinding shape maintained by the dressing operation.

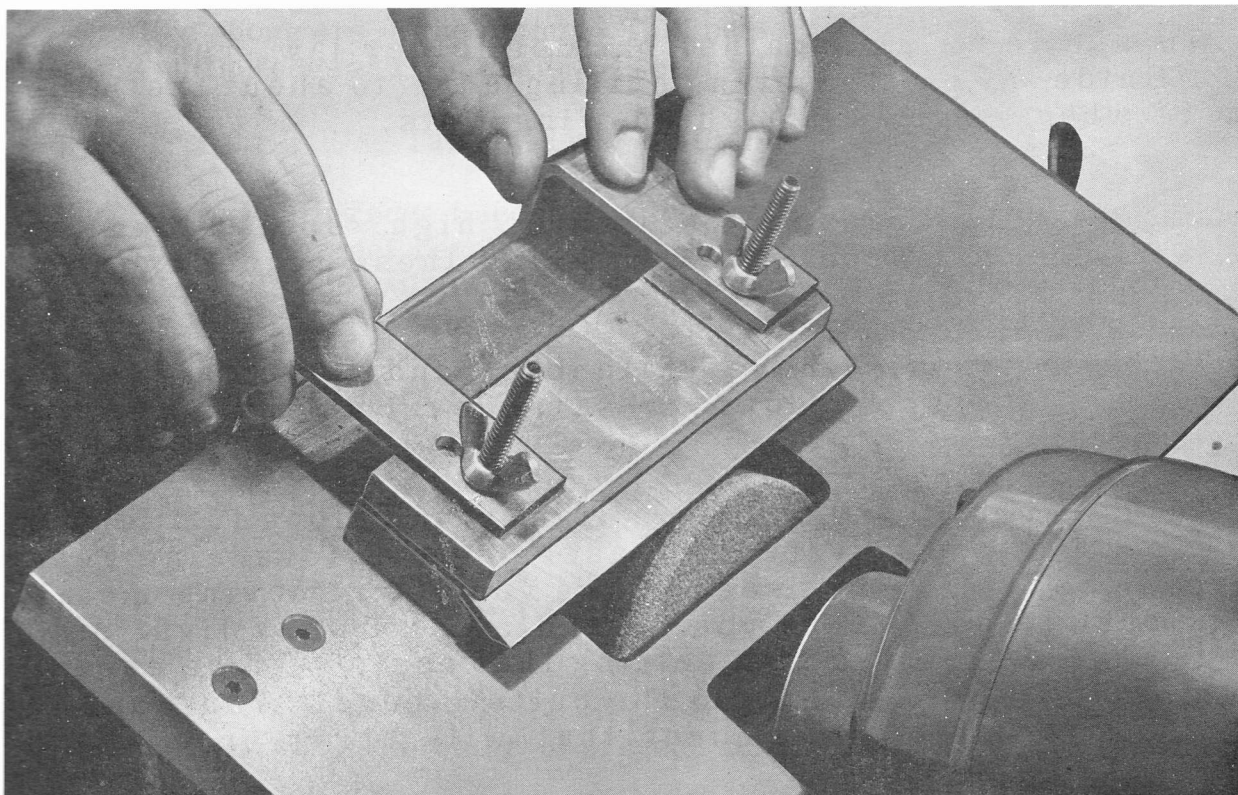
Move the dressing brick back and forth across the wheel as shown in the illustration. Hold the brick firmly against the wheel and move at an even rate of speed.

A "dry" grinding pass without the motor turned on lets you practice the proper motion across the wheel of tools that you may not have sharpened before. During this practice pass, you may also want to turn the wheel by hand to check the location of the grind and the degree of Table tilt. After the dry pass, turn the motor on and make light grinding pass.

Detailed instructions for popular tools are shown on the following pages. After you have completed this series of grinds you will find that you are prepared for most any tool that your customers may bring into your shop. You will have explored the many grinding capabilities of your Belsaw.. and will quickly recognize the easiest and fastest way to sharpen many additional tools.

JOINTER AND PLANER KNIVES

The Tool Holder Clamp and Base have slanted jaws for gripping planer-jointer knives at a 15° angle. It holds knives up to 8" long... see accessory Holder for longer knives.



1. Place knife between the two slanting jaws as illustrated.

2. Tilt Table to give the desired grinding bevel, usually 30° to 45° . You already have 15° from the slant of Tool Holder jaws so when your pointer reads LEFT 15° you would be grinding a 30° angle. When it reads 30° you would have the normal maximum of 45° . As a general rule planer and jointer knives are ground with a bevel of from 30 to 45 degrees. In some cases the user of the knives will specify the bevel he desires. If bevel is not specified, it is well to duplicate approximately the bevel on the knives. In most cases this bevel is not critical but you should stay within the 30 to 45 degree limit. To check bevel, use an inexpensive protractor.

EXAMPLE:

Setting up machine to duplicate angle on planer knife for a 30 degree (Fig. A). Length of bevel equals two times thickness of knife. For a $1/8"$ thick knife the length of bevel would be $3/16":$ (Bevel= $1-1/2 \times 1/8"$ = $3/16$).

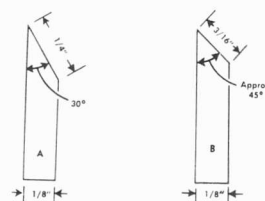


Fig. A.

To duplicate present bevel, tilt Table while sighting into end of the knife. When the beveled area is parallel to wheels face, tighten the pivot and Lock Screws.

3. With knife firmly against back of Holder jaw, run screw thru Guide holes that bring cutting edge to about the middle of wheel face, and tighten Wing Nuts.

4. Make a "dry" pass to locate any "high" spots along the knife and adjust Feed Screw to grind these highest points first.

5. With motor on, move knife back and forth rapidly to bring all high spots down to same level as main part of the knife.

6. Adjust Feed Screw to give a light grind along full length of the knife. Make repeated passes before advancing Feed Screw. So long as you see sparks you are removing metal: It is best to do ALL of your grinding at a very light setting. Avoid grinding at a setting that could remove excessive amounts of metal from the cutting edge. You want to remove the minimum amount that will bring up a sharp straight edge.

7. Keep Guide firmly against Table edge while moving Holder back and forth to assure straight travel.
8. Avoid rounding ends by moving rapidly past the wheel.
9. Make your final light passes a little slower to give smooth finish.
10. When finished grinding remove any "wire" edge with an emery stone.

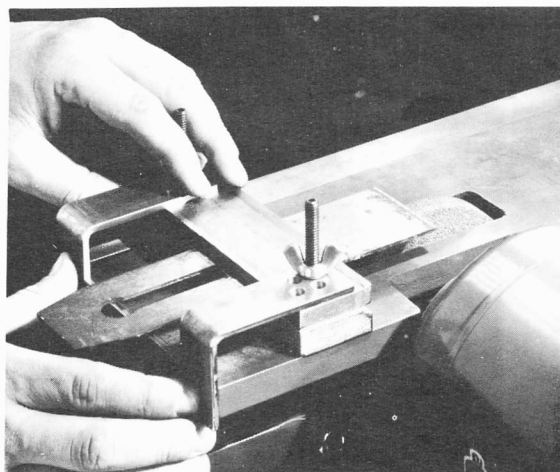
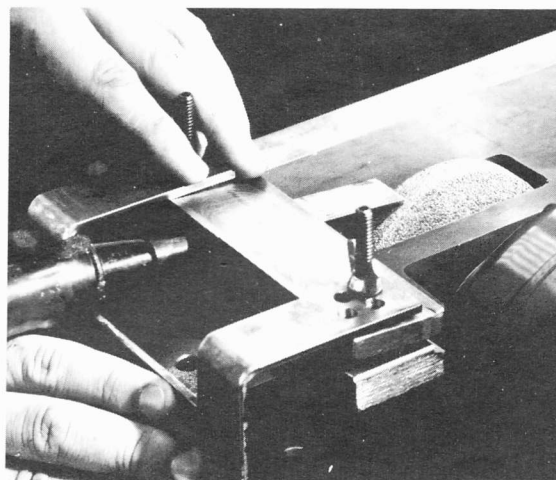
NOTES: It helps to make sure you are grinding at correct bevel: by coloring the bevel area with lacquer or ink- by checking the amount of color you are removing you can easily tell when wheel is contacting the knife's edge at the correct bevel. If you find that you still do not grind the entire colored area after properly adjusting Table, dress the grinding wheel to make sure it is straight across face.

WOOD CHISELS, PLANE IRONS AND OTHER STRAIGHT EDGE TOOLS...

Straight edge tools are positioned in the Holder as the chisel and plane iron pictured.

1. Bring edge of tool against either of the milled shoulders in the clamp. This puts the cutting edge at right angle to the wheel.
2. Fix the Tilting Table at level position.
3. Bring cutting edge to contact with wheel that gives correct bevel, fit screws into proper holes of tool Guide and tighten the Wing Nuts.
4. Adjust Feed Screw to give very light grind.
5. Move Holder back and forth rapidly with Guide riding against front edge of the Tilting Table. Light pressure on Guide will help assure straight travel of cutting edge across the wheel.

If tool heats, dip in water to prevent annealing the edge.

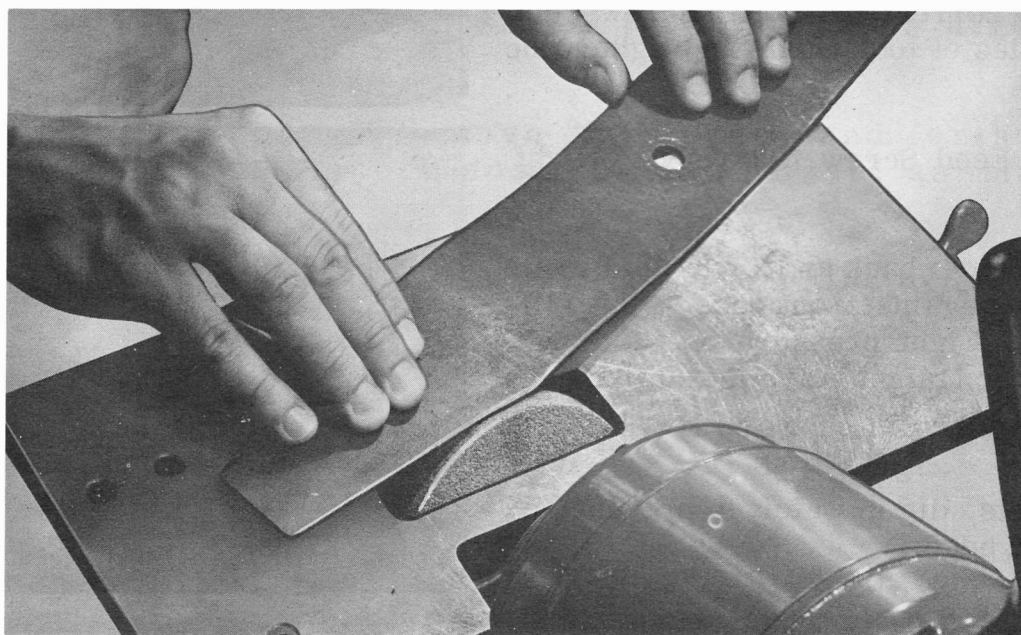


ROTARY LAWN MOWER BLADES

1. Place lawn mower blade on Tilting Table and adjust for grinding bevel you want by sighting the contact of the grinding wheel on the mower blade.
2. Hold blade as shown in the illustration... one hand to control the grinding pass, the other to steady the blade and maintain an even grinding pressure against the wheel.
3. Feed back and forth until a sharp cutting edge develops.
4. Reverse the blade and repeat.
5. For smooth operating mowers, the blades should be balanced... that is the metal on each side of the arbor hole should weigh the same. Since the blade turns from 2000 rpm for electric mowers to some 3600 rpm on some 2 cycle gasoline models, a few ounces difference in weight creates objectional vibration at operating speeds.

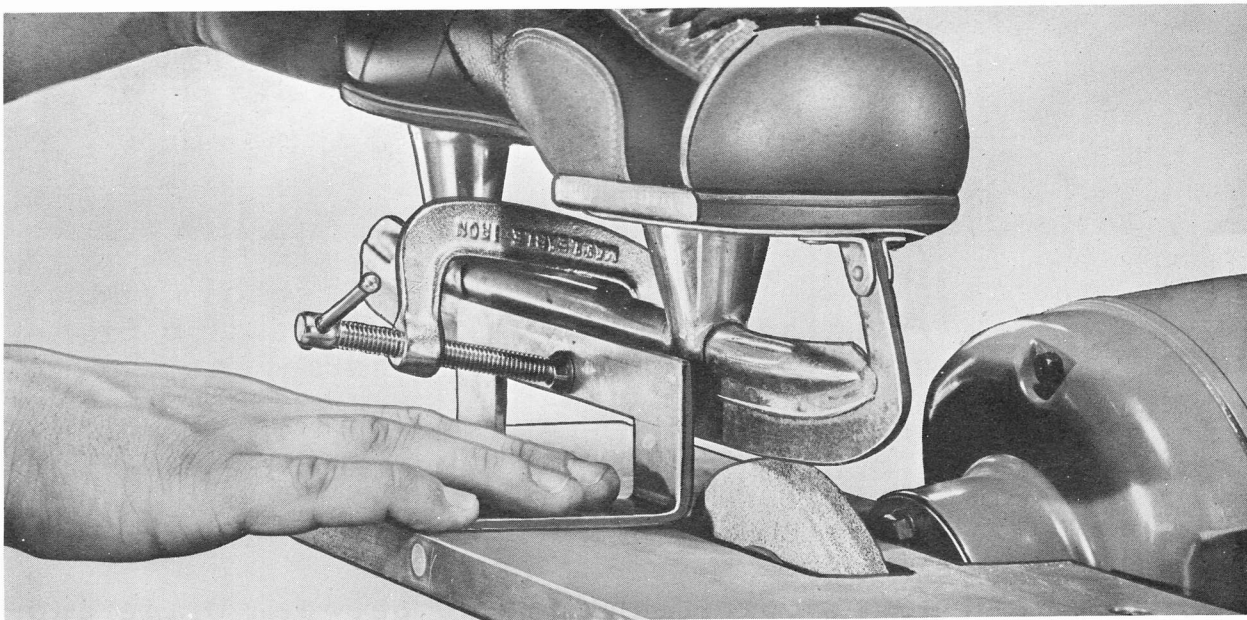
The simplest way to test blades for balance is to insert the blade of a pocket knife in the arbor hole and check for a heavy end. There are several balancing tools from those that use this principle to those that check dynamic balance while the blade is revolving.

After you have decided on the heavy end of the blade, grind weight from either the end or the back... do not attempt to remove this weight by grinding the cutting edge. Continue checking until the blade is in balance.



ICE SKATES

1. To support the skate, clamp its runner to the Tool Holder Guide with C-clamp as pictured. Use a nut or pad about 1/2-in. thick to set the skate away from the guide so as not to grind it.
2. Tilt table to grind blade square across. Tighten Lock Screw.
3. Adjust Feed Screw so lowest part of the curve of the skate blade contacts grinding wheel.
4. Make a dry pass, rocking the heel of the skate up and down as needed to give even contact with grinding wheel full travel of the skate blade.
5. Turn motor on and move skate at an even rate of speed for uniform grind along entire length of blade. A quick even motion is necessary to avoid digging or gouging any part of the blade.
6. Grinding wheel dressed square across gives flat grind. Hollow grind can be developed by dressing face of grinding wheel round and rigging blade guide so repeat passes contact wheel at same location.

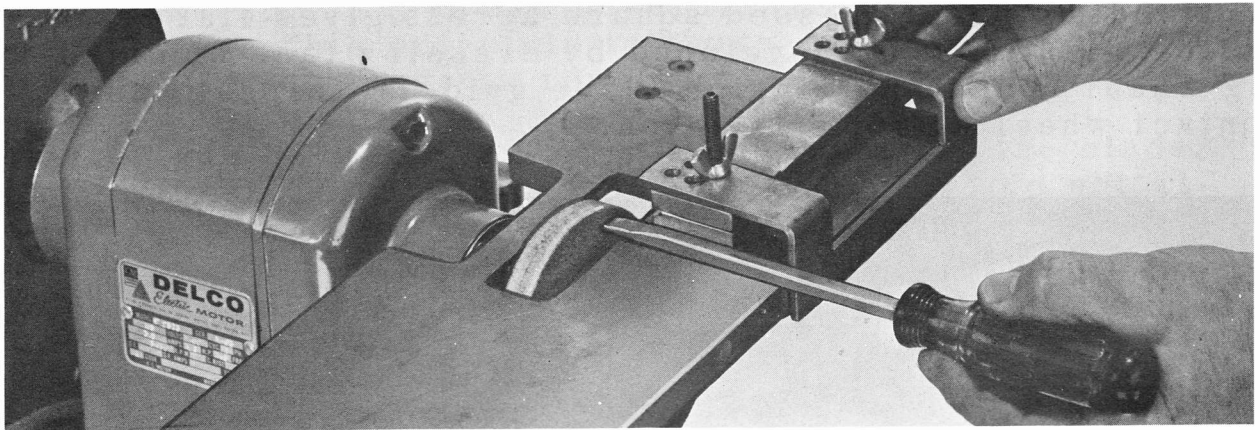


NOTE: We also offer an accessory Ice Skate Grinding fixture for customers who develop a good volume of ice skate sharpening business.

SCREW DRIVERS

Few things are more bothersome than a dull or broken-edge screwdriver-or more ruinous of screws. When properly sharpened, the edge of a screwdriver should be a perfect rectangle with straight (not beveled) sides... should be absolutely flat and at right angles to the centerline of the shank. The two sides and two faces should taper outward slightly from edge to shoulder... should be perfectly flat (not beveled) and squared with each other. The sides and corners of the edge should be sharp. And, of course, the shank should be straight. In use, the screwdriver should bottom in the screw slot and should fill the slot. Using an undersized screwdriver in too large a slot or failure to seat the screwdriver properly (because of paint or dirt) will damage both.

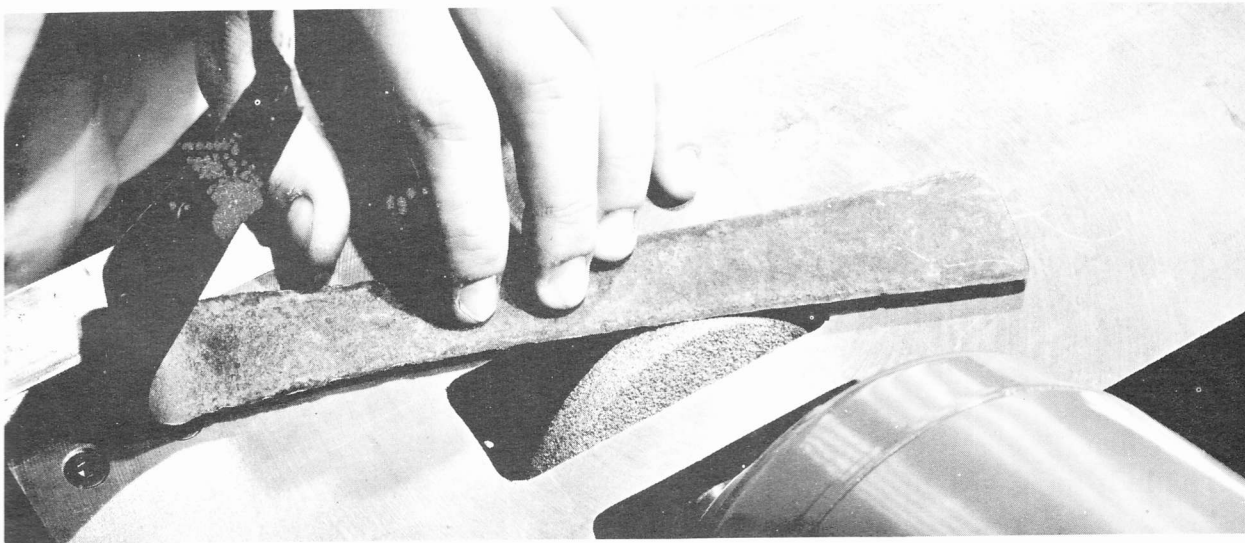
1. True up the sides and faces by holding them against the side of the wheel. Rest your hands on Tool Holder or convenient support to maintain grinding bevel. Move the tool with figure 8 motion at all times during grind to avoid gouging the wheel. Dip blade in water frequently to prevent overheating.



2. After truing faces, hold shank against the square end of tool holder, adjust Table for square grind on the blade edge and move screw driver back and forth across wheel.

GRASS WHIPS

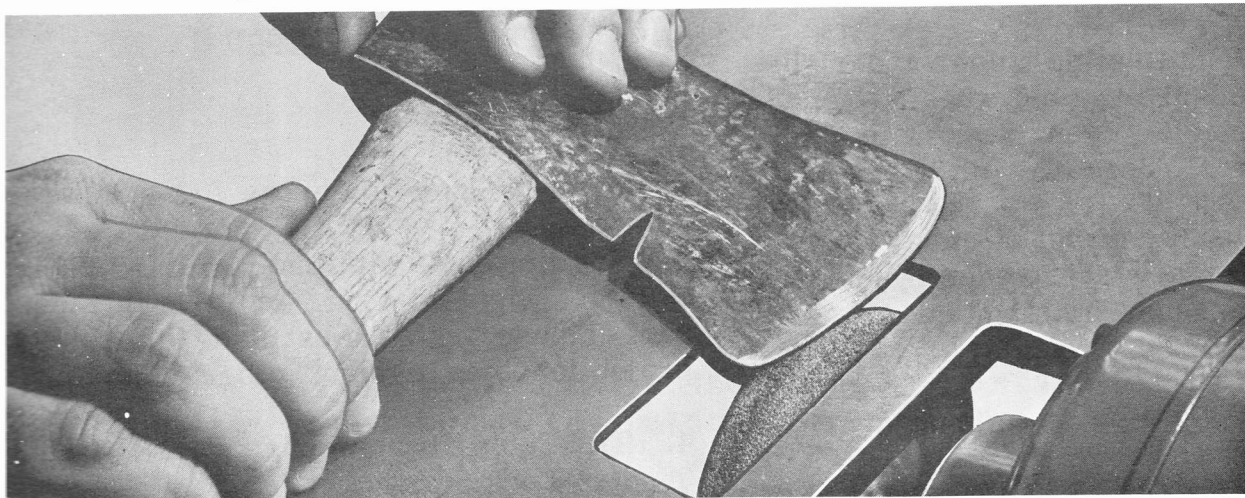
1. Tilt Table till pointer reads 25° LEFT. Tighten Lock Screw.
2. Adjust Feed Screw for light contact between blade and wheel.
3. Steady grass whip with one hand and make a dry pass. Use other hand to pull blade diagonally across the wheel and twist blade as needed to develop light grinding contact.



4. Turn on motor and grind with medium pressure.
5. Often these blades are badly nicked and will require several passes across the grinding wheel.
6. Reverse the blade and repeat.

AXES

1. Tilt Table till pointer reads 15° LEFT. Tighten Lock Screw.
2. Adjust Feed Screw for light grind.
3. Grasp the handle with one hand and use the other to act as a pivot point. Swing the handle as you grind the blade to maintain the curved cutting edge.
4. Turn axe over and repeat on other side.
5. When some axes are badly nicked and will require several grinding passes, do not crowd the grinding wheel. It is important to avoid overheating this type blade.



CLEAVER WEDGES

Follow same procedure as axes

HATCHETS

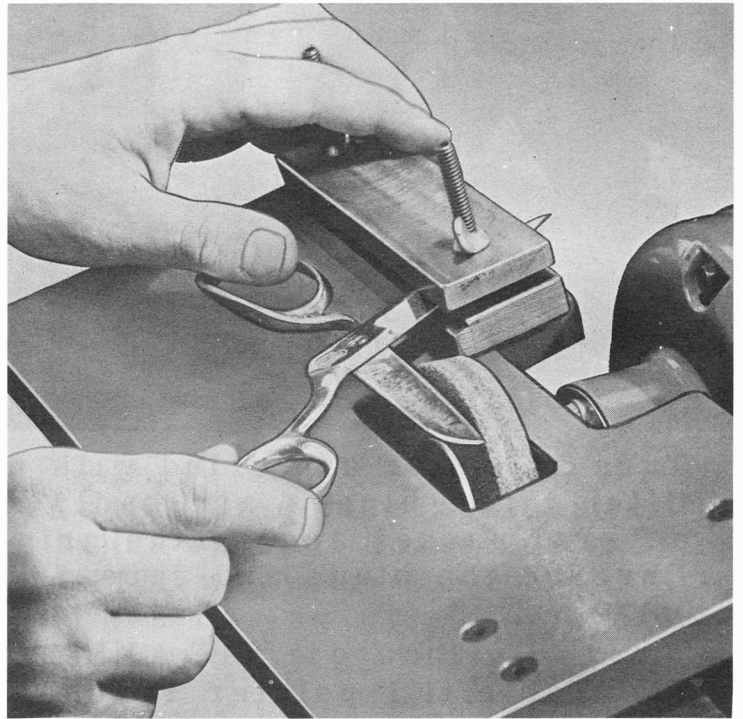
Follow same procedure as axes... but move both hands in the grinding pass to develop keen straight edges.

SCISSORS

Scissors are clamped in the Tool Holder as pictured:

1. Remove the Guide and position Clamp with its lip UP, resting on the top scissors blade.
2. Tighten right hand Wing Nut.
3. Then turn left hand Wing Nut down to hold top scissors blade snug with the resulting wedging action.
4. Tilt table to 5° right and tighten Lock and Pivot Screws.
5. Adjust Feed Screw to bring bottom scissors blade against side of grinding wheel.
6. Use "dry" pass to get scissors into position that makes it easiest for you to bring the bottom blade nearly straight along side of wheel and as close as you can get to the fulcrum screw. Slant blade until you reach best position and then tighten the left Wing Nut.
7. Dress side of grinding wheel clean and smooth.
8. Use left hand to slide holder and right to control pressure against wheel. Or, if more comfortable to you, slide with right hand and control pressure with left.
9. Remove least amount of metal necessary to bring up new sharp edge by making several light passes. The lightest possible contact will give best results.
10. Reverse scissors in holder to grind the other blade.

With very little practice you will be able to put scissors into sharp condition in a very few minutes.



You will occasionally get scissors that are bent out of the shape required to cut freely. These are best corrected in an inexpensive Scissors Press.

TIN SNIPS

1. Separate blades
2. Adjust Tool Holder as for scissors.
3. Position blade with inner side DOWN in Holder. Tighten Wing Nut near thickest part of blade first. Adjust blade for desired projection then tighten other Wing Nut.
4. Tilt Table till pointer reads 5° LEFT. Tighten Lock Screw.
5. Adjust Feed Screw to grind blade on side of wheel.

6. Grind blade from heel to point using a very light pressure. Keep moving the blade at all times so that the same SMALL AMOUNT of metal is removed along the entire cutting edge.

7. Follow present shape closely.

8. Repeat same procedure on other blade.

LOPPING SHEARS

1. Separate blades.

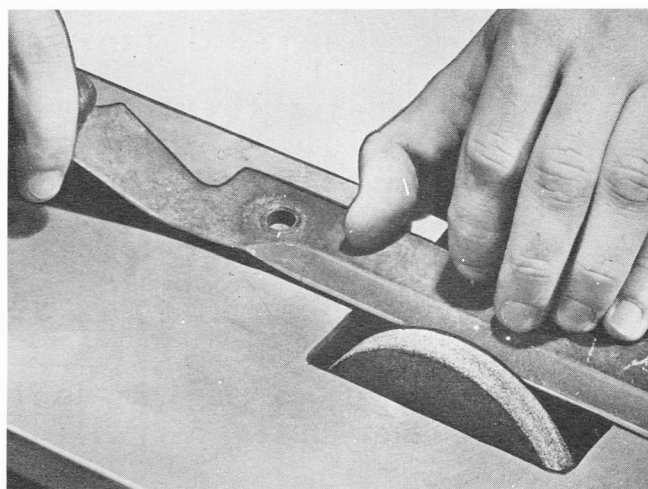
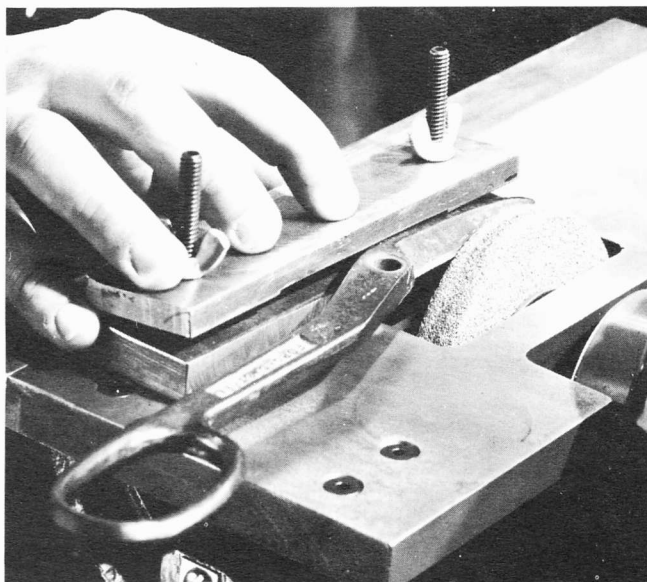
2. Tilt Table till pointer reads 5° RIGHT. Tighten Lock Screw.

3. Adjust Feed Screw to grind on side of wheel.

4. Grasp handle with one hand to pull the blade past the grinding wheel. Use other hand to help maintain the blade steady on table and control the grinding pressure.

5. Grind very lightly. Maintain the shape of the blade. Make repeated passes as needed.

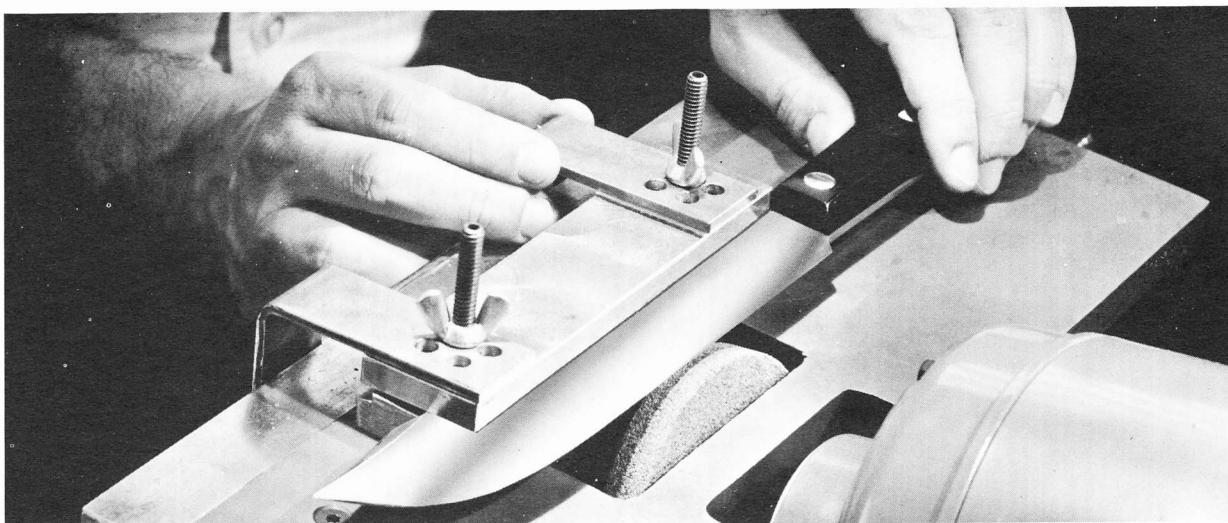
6. Grind the other blade in similar fashion.



BUTCHER KNIVES, PARING KNIVES AND SIMILAR CUTTING EDGES

1. Tilt table till pointer reads 10° LEFT. Tighten lock screw.

2. Hold knife in tool Holder between the two straight jaws. Set Wing Nuts half-tight in the holes of Tool Holder Guide that permit knife blade to contact face of grinding wheel about the middle. Turn the grinding wheel by hand and adjust knife alignment in holder for uniform grind on the usual straight section of the blade, letting the curved section project past holder. Tighten wing nuts.



3. Adjust Feed Screw for light grind. Draw knife at even fast speed across the grinding wheel, pulling its handle toward you to grind the curve as it goes to the point.

4. Grind lightly, make repasses as you need them.

5. Turn knife with handle to opposite end of tool holder and repeat as above to grind other side.

SHARPENING PRICES

Knives, butcher, carving..	35¢ to \$1. 50	Rotary Lawn Mower Blades	1. 50
Planer-Jointer Knives, 6-in.....	50¢	Hedge Trimmers.....	75¢
12-in.....	1. 00	Grass Whip.....	75¢
Scissors.....	75¢	Axes-Single Bit.....	50¢
Shears.....	15¢ to 75¢	Double Bit.....	1. 00
Tin Snips	50¢ to 75¢	Chisels.....	25¢
Ice Skates	1. 50	Screw Driver.....	15¢

BELSAW SERVICE DEPARTMENT

We hope that you will find this manual helpful in getting off to the right start and in answering questions you will come up against with experience.

As a registered BELSAW owner, you will receive regular issues of the BELSAW BULLETIN. These BULLETINS carry reports and pictures from users of Belsaw equipment throughout the world.

Please also feel free to write us for help on any problem or question you cannot answer from this manual. Address your specific questions to:
SERVICE MANAGER, BELSAW MACHINERY CO. 315 Westport Road.

Kansas City, Mo. 64111

Welcome to the steadily growing family of Belsaw operators.. and GoodLuck

SHARPENING ACCESSORIES

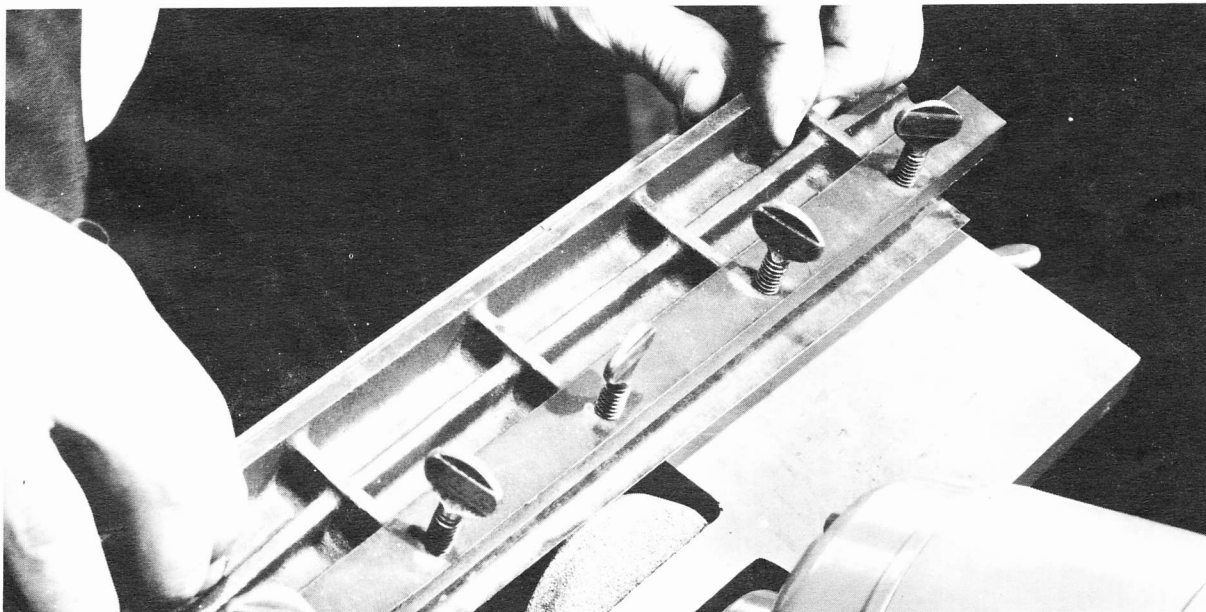
For Extra Profits.

Many Belsaw Owners develop sufficient business on specific items to justify adding accessories to handle them more quickly and easily. We show below brief descriptions of the procedures followed with some of the most popular accessories. Detailed instructions are packed with each of these and all other Belsaw accessories.

No. 270 Long Knife Holder

For use on Model 1055 only. Increase your grinding capacity over the 8" length provided with your standard holder. Handle thin planer and jointer knives up to 12" long, 3/4" to 1" wide on Sharp-All work table. The long thin knives may bow as well as bend when removed from their machines... this holder straightens them and keeps them true in all directions for accurate sharpening.

1. Clamp knife in holder, knife back solidly against bottom of milled slot.
2. The holder tilts knife for 15° grinding bevel. If you want the knife ground with 30° bevel, tilt Table 15°. For 45° bevel tilt Table 30°.
3. Adjust Feed Screw for light grind. Use repeated light grinds till new sharp cutting edge is developed.
4. For matched sets, grind other knives in similar fashion to same resulting width. Check width either by measuring or comparing knives back to back.

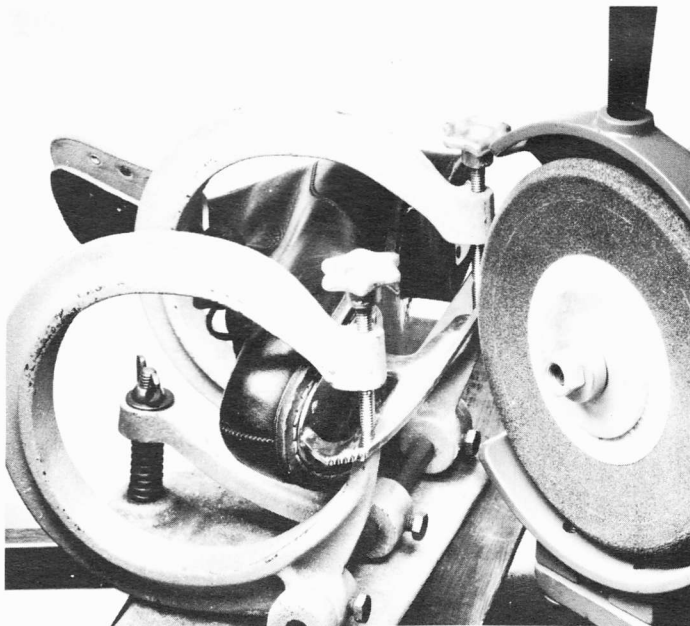
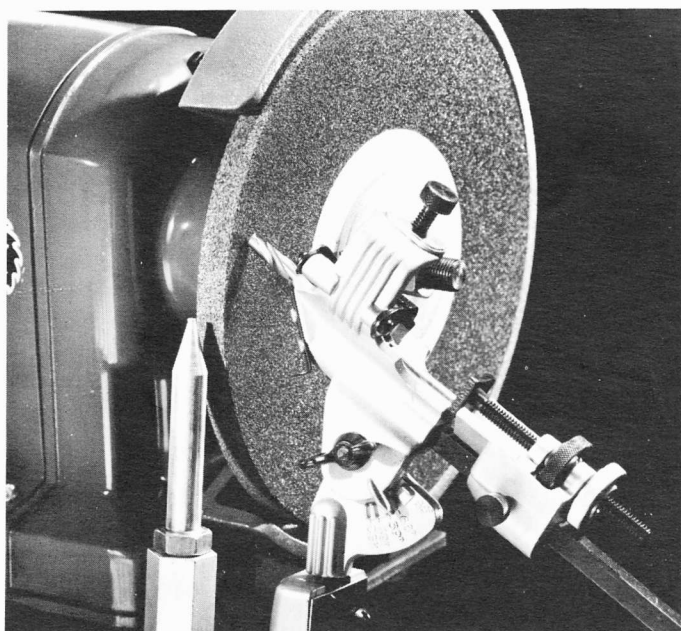


No. 251 DRILL BIT GRINDER

1. To mount, remove the right front No. 38 Cap Screw and Washer. Bolt the Mounting Plate securely under No. 36 Motor Pivot Base with Cap Screw, using hole closest to the grinding wheel. Swing the Mounting Plate approximately to 45-degree angle to the right side of the Sharp-All.
2. Attach the Drill Bit Holder to the Mounting Plate at right angles to the flat side of the Grinding Wheel with bolt and nut that you furnish.
3. Set tool at grinding angle. (59-degrees is for general purpose) other settings range from 88-degrees to 41-degrees.
4. Place drill in trough as illustrated, cutting lip about 1/16-inch beyond lip rest.
5. Swing drill back and forth to grind. Feed into grinding wheel by turning Feed Screw.
6. To grind second lip; rotate drill half turn and repeat.

No. 256 ICE SKATE HOLDER and TABLE

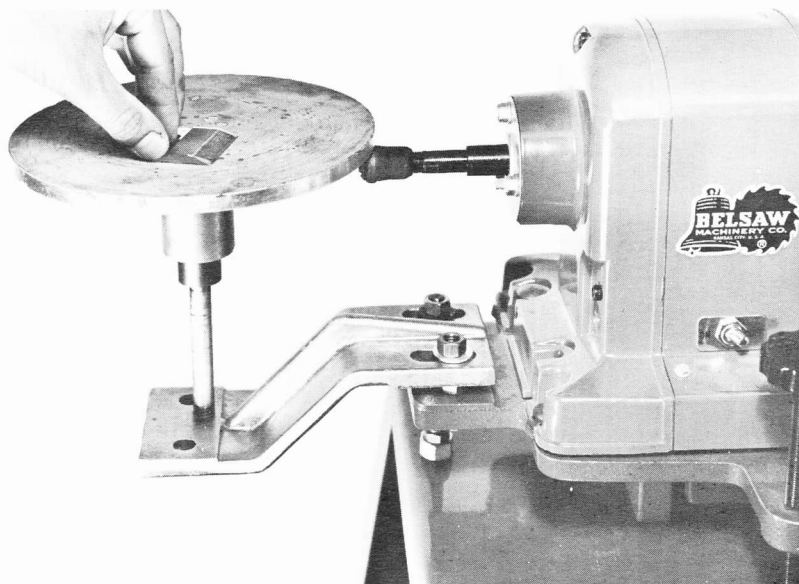
1. Anchor table in place of Saw Tooth Rest.
2. Use 8-inch diameter 3/8-inch or 1/2-inch thick wheel dressed to 45-degree bevel.
3. Clamp skate in Holder and turn holder tilt-adjustment knob to grind skate blade square across.
4. Move skate back and forth across wheel. Produces very light hollow grind, the kind most people want. Greater hollow is developed by moving grinding operation toward front of wheel.



NEW SHARP-ALL HONE ATTACHMENT

This newest Belsaw accessory provides for sharpening and honing barber clippers, animal clippers, scissors, surgical instruments—and other cutting edges where finest finish is required. The hone is mounted on left side of the Sharp-All as illustrated. It is driven by the rubber tip attached to motor shaft at the desirable honing speed of 140 RPM. The 8-inch diameter plate is machined to assure flat honing surface. The attachment includes bottles of adhesive and abrasive honing grit.

This low cost Sharp-All accessory lets you handle profitable honing work usually done only on separate honing machines priced from \$100 to \$250.



No. 274 HONING ATTACHMENT

Mist Cooling System

Sharp-All owners who have tried it say that mist cooling is the most important development in sharpening since the Abrasive Belt Grinder.

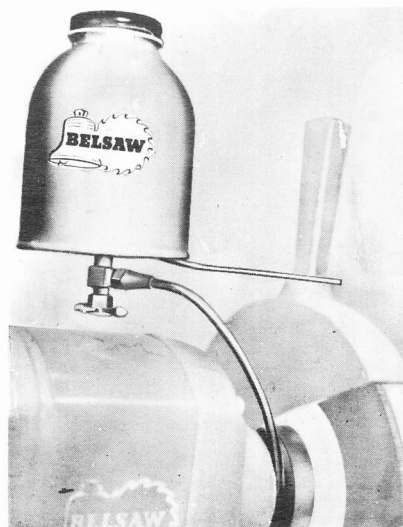
Mechanics have long agreed that wet grinding is far superior to dry grinding . . . also best for drilling, milling and other machining.

Mist cooling is now available to BELSAW operators at such low cost that it is fast becoming standard in all shops. Customers who have experimented with mist cooling simply won't go back to dry grinding. They report faster cutting . . . far less "burning" . . . reduced loading of wheel . . . and elimination of dust. Wheel life is so greatly increased that this alone more than pays for all costs of mist cooling.

We have developed a Mist Dispenser that does not require connection to an air compressor as it works by centrifugal force. It provides a fog of coolant directly to the work area for highly efficient mist cooling. **This low cost unit is quickly fitted to the Sharp-All, regular grinders, lathes, milling machines, saw filers . . . other metal working tools.**

We include with each unit one pint of Belsaw Mist Coolant. This concentrated lubricant is water sol-

uble, non-toxic, non-flammable and rust-preventive. Mixed with 50 parts water, one pint yields over 6 gallons of coolant, enough for six to nine months of daily use on the average.

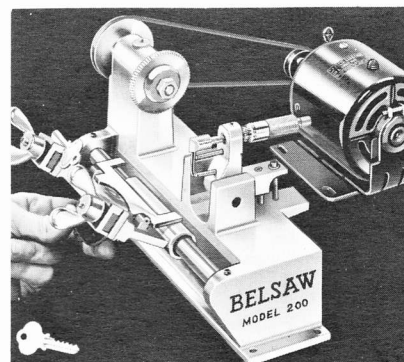


NO. 711 MIST DISPENSER is shown installed on a Belsaw Sharp-All. The coolant container is fitted with valve for adjusting feed into the collector ring mounted inside grinding wheel. Coolant is collected in the ring and squeezed thru a small hole into the wheel blotter by centrifugal force. The coolant comes off the wheel blotter in a fine mist which travels in a circular motion with the wheel. This mist envelops the saw tooth to provide efficient cooling.

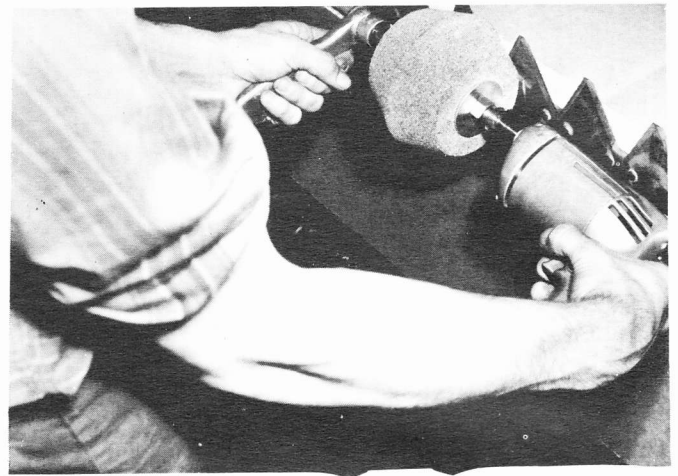
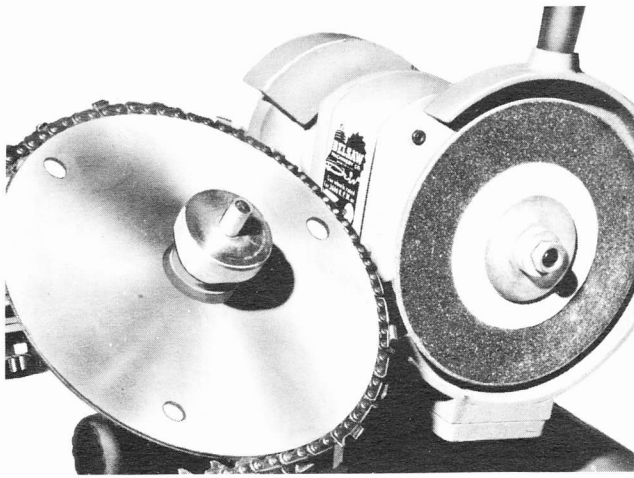
Key Machine

•••••The Model 200A Key Machine illustrated here is designed to duplicate all types of cylinder keys which comprise 90 per cent of all keys in use today. It will do the same work as many key machines selling at much higher prices.

An outstanding feature of the Belsaw 200A is its adjustable micrometer key guide which can be quickly set to compensate for any wear in cutter or key. Its key vises swing full 180 degrees with narrow holding shoulder on one side and wide shoulder on the other. Large thumbscrews with thrust bearings insure easy positive clamping of key and blank.



MODEL 200A BELSAW KEY
DUPLICATOR



No. 266 Chain Saw Sharpener:

1. Mount Chain Saw Sharpener on Tilting Arbor and center with Saw Locating Cone.
2. Use 3/16" grinding wheel dressed round face for 7/16 pitch chain, 1/4" wheel for 1/2 pitch chain.
3. Fit saw chain in milled slot of chain saw sharpener with teeth pointing clockwise.
4. Tilt arbor down to Right 35° and swing base arm to grind present hook of teeth.
5. Adjust front Feed Screw to grind to uniform depth, just above gullet.
6. Grind all teeth with points UP.
7. Tilt arbor down to Left 35° and grind remaining cutting teeth in like fashion.
8. Adjust Tilting Arbor level and grind depth gauges .030-in. below tooth points. Round off corners of depth gauges.

No. DS4 Sickle Sharpener:

1. Attach Holding Clamps included, on solid bench for grinding sickle in either flat or upright position, whichever is easiest for you.
2. Check the trueness of your drill chuck to eliminate possibility of vibration. Insert sickle cone end in chuck for either 1/4" or 3/8" drill.
3. Grind sickle freehand.



HOW TO START YOUR SHARPENING BUSINESS



While there is plenty of sharpening business in every community, people have to know that YOU are in the sharpening business and WHERE you are located.

There are THREE proved methods that have helped hundreds of others to develop profitable sharpening shops:

1. Put up SIGNS that tell what you can do and WHERE you are located. A sign in front of your actual location will attract people who pass by. Another on the nearest highway or other heavily traveled thoroughfare will lead people to come to your shop. A sign in your nearest hardware store or lumber yard will bring business.
2. Ads in your NEWSPAPER can pay. Tell the newspaper classified ad manager what you want to advertise and he will help you work it out. Also ask your newspaper to run a story about your new business - this will give you FREE publicity, letting people know that you are equipped to sharpen their saws and cutting tools.
3. Make personal calls on your friends, carpenters, builders and woodworking shops; they all have sharpening work. Call on hardware stores and lumber yards to let them know that you can sharpen their tools and those of their customers. Leave several business cards every place you call.

These are the simple basic ways to get your business started. Most operators report good results from telephone yellow page listings. Others make out lists of probable customers from the yellow pages and mail them advertising cards. You will find a method that works best for you and can then concentrate on it.

If you have the time to make personal calls on a regular route to pick up and deliver, this method can be most effective. If you do not want to make such calls, you can probably find someone to do it for you on a commission basis. Several operators report such arrangements with bread salesmen and laundry drivers.

Another very effective commission set-up is with the hardware stores and lumber yards. Most of these are anxious to have a reliable sharpening service for their customers and are glad to take in the work for you to collect at regular intervals.

If you have prospects that will be able to give you regular sharpening work in good volume, such as builders and woodworking plants, a good way to get started is to offer a free sample. Offer to sharpen one of their saws or other tools on a free trial to prove that you can do the work.

At the very start of your business, make a record of every customer so that you can telephone or mail reminders of your sharpening service. Also, make sure that each tool you sharpen carries something to show your name, address and telephone number. This can be a sticker, a business card or some other label. You may want to get a rubber stamp to use for this purpose.

If you have not already received your copy of our free booklet "HOW TO START YOUR OWN SHARPENING BUSINESS ON A SHOESTRING" please write for it. One or more of these simple selling ideas may fit your own situation.

Competition is seldom a real problem to the BELSAW operator. With some practice you will be able to turn out sharpening work that will satisfy your most critical customer.

You may find some larger outfits that hesitate to give you any sharpening because they've gotten such poor work in the past that they've been forced into doing their own sharpening. Convince these skeptics that YOU can give them the quality and service they require by offering to do the first tool FREE.

Don't overlook the "unusual" places - many operators make extra profits sharpening tools used in garages, shears for tailor shops, hedge trimmers for gardeners, pinking shears for dressmakers, animal clippers for veterinarians, saws and other paper knives for printers, etc.

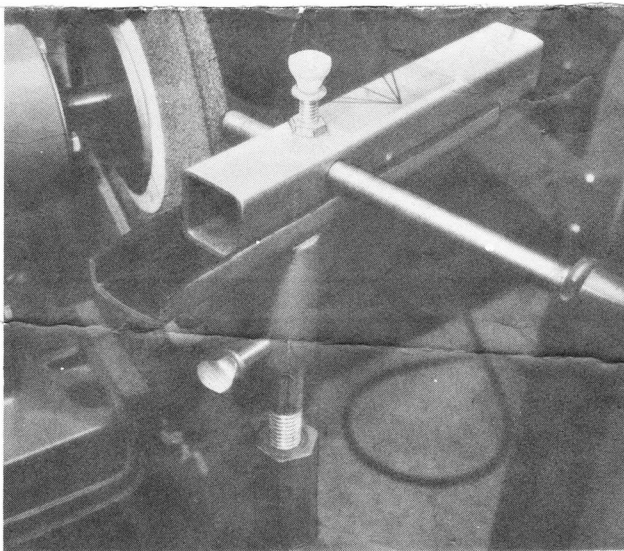
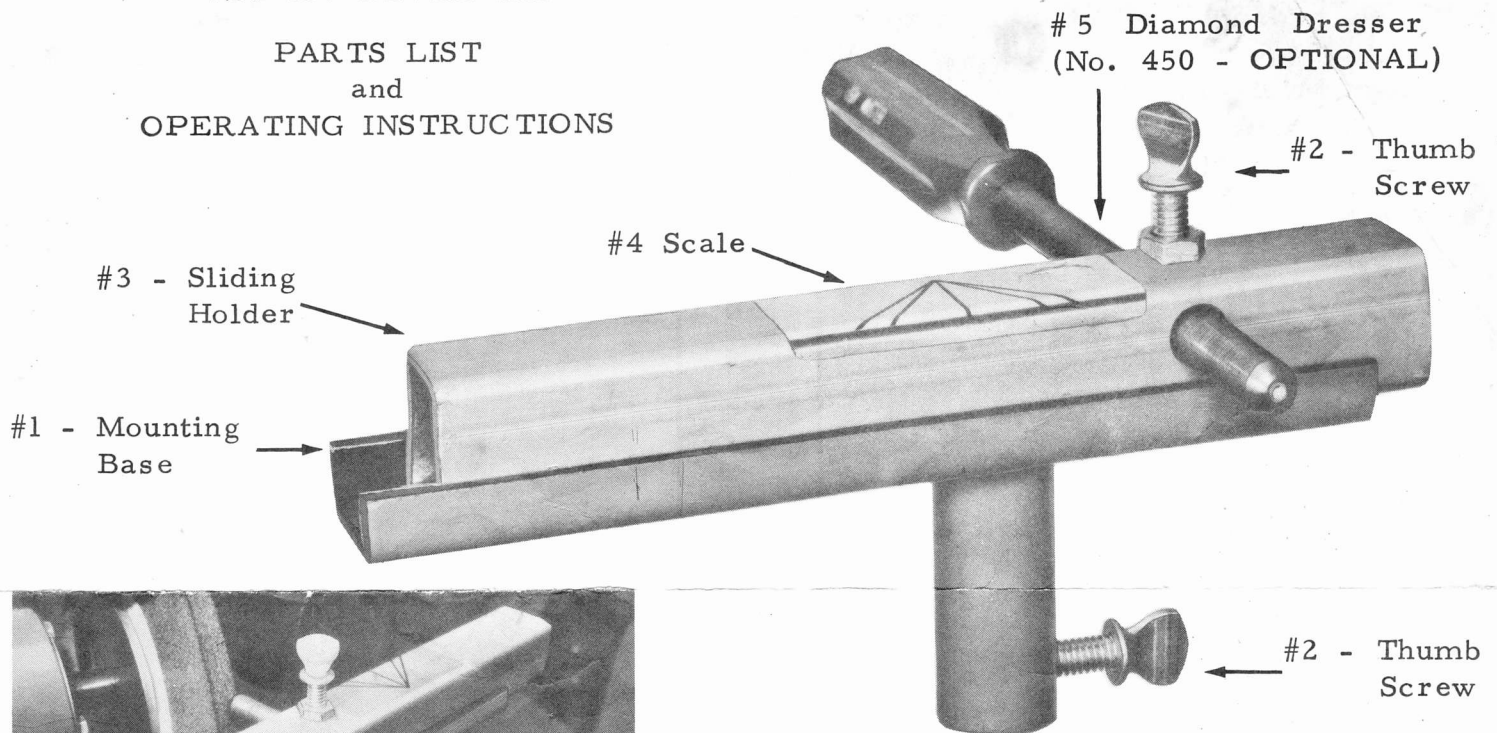
You will receive our quarterly magazine, the Belsaw BULLETIN, carrying pictures and reports from sharpeners throughout the world. It also brings you shop notes that may help you improve your results on different sharpening jobs.

And remember that the BELSAW Service Department is always ready to help you with any sharpening question. We have tried to cover everything possible in this manual but if you run into questions don't hesitate to write for answers. We'll either have the data or get it promptly from one of the hundreds of successful BELSAW operators.



No. 457 BEVEL-AID

PARTS LIST
and
OPERATING INSTRUCTIONS

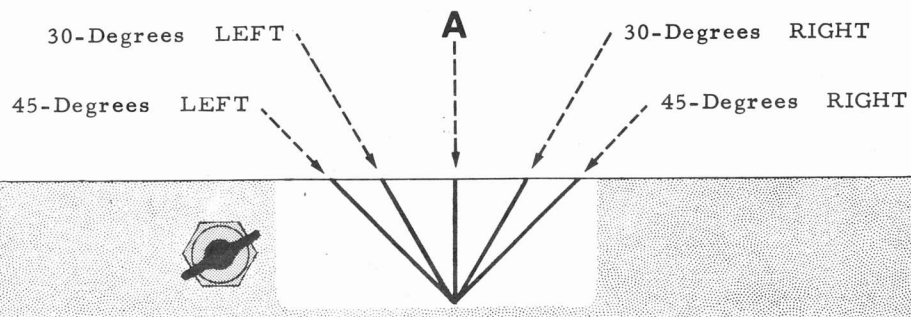


INSTALLATION:

Place Base over T-305 Saw Rest as shown, and tighten #2 Thumb Screw to maintain desired angle.

SCALE OF DEGREES

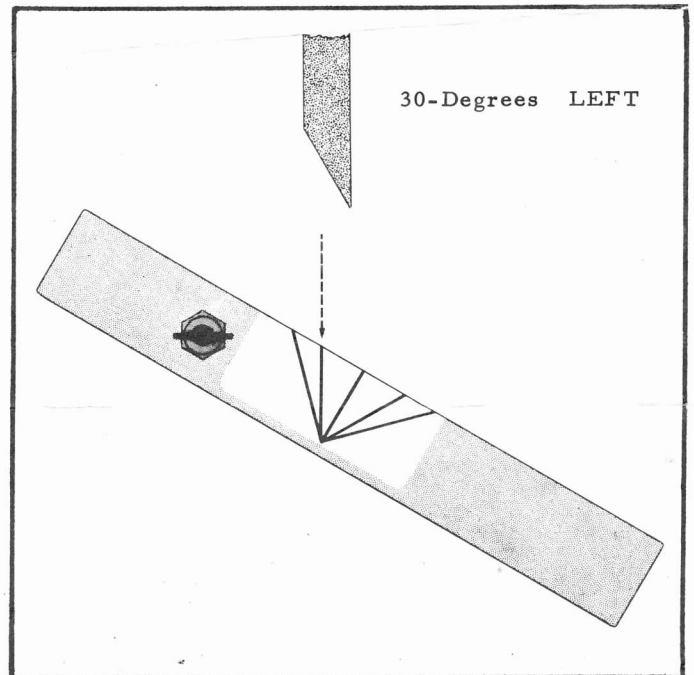
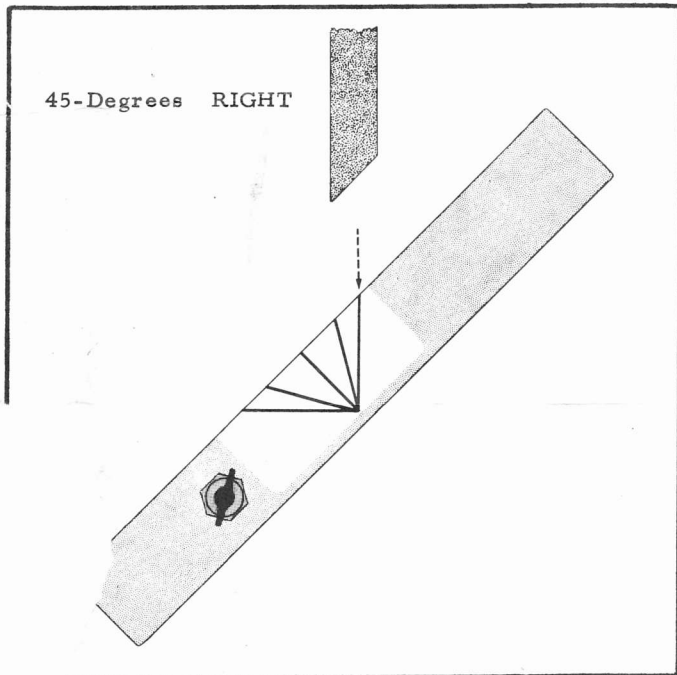
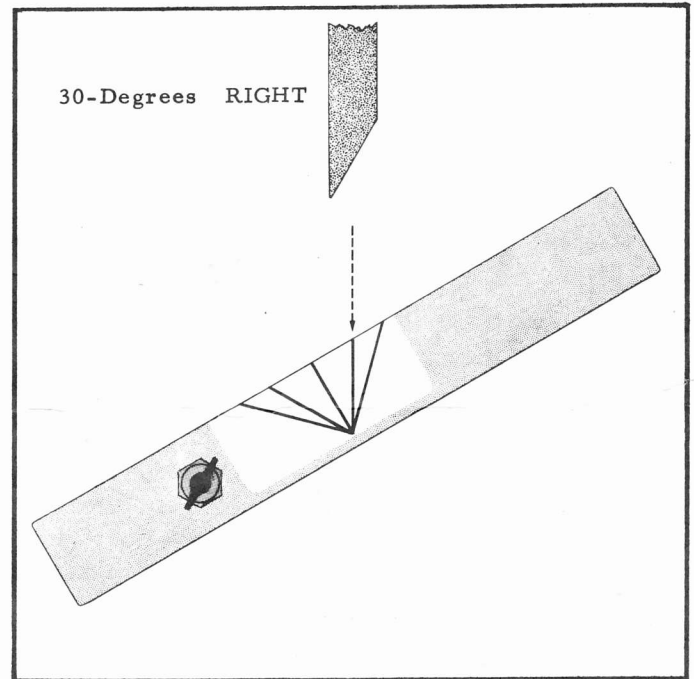
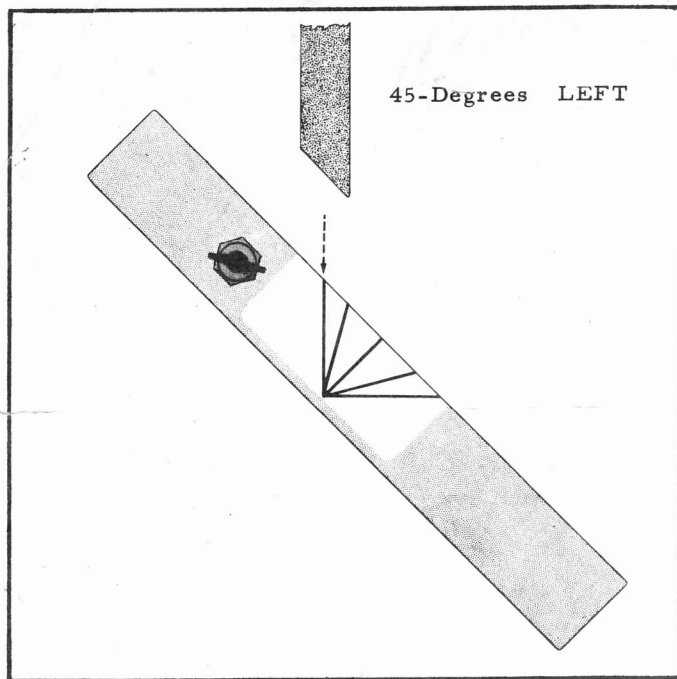
Until you become familiar with the scale on your Bevel-Aid, you may wish to clip the chart below and tape on or near your Sharp-All.



Bevel-Aid can be adjusted to any desired angle, but we have marked on the top of #3 Sliding Holder the most commonly used angles. To adjust for dressing wheel for a flat face (90-degrees), adjust #1 Base so that line "A" is in a straight line with the grinding wheel, as illustrated.

(OVER)

The #1 Base is held in position by the #2 Thumb Screw. Before making final adjustment to desired angle, adjust the height of the Base so that the tip of the dresser will contact the grinding wheel level with the motor arbor. The #450 Diamond Dresser should be re-adjusted after each pass until the desired angle is obtained.



PLEASE NOTE: When beveling new wheels for the first time, or thicker wheels such as the 3/8-inch or 1/2-inch, do not attempt to remove too much from the wheel at any one time. By trying to do so you may grind behind the diamond tip of your dresser and loosen it in its' mounting. This will ruin the dresser for further use since these diamond tips cannot be re-mounted. As when dressing wheels by hand, take several light passes across the wheel until the desired angle is obtained.